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BOOTLEGGING IN HIGH TECHNOLOGY

R&D DEPARTMENTS: FROM INITIATION

TO DISCLOSURE

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ABSTRACT

Bootlegging - the unauthorised projects initiated by an employee and directed toward innovation for the benefit of their organization - is an important aspect of innovation, because it is considered to be a great source of bottom-up innovation within organisations. Since it is clandestine and hidden from management and researchers, it has remained one of the least researched aspects of the innovation process.

There are a handful of studies on the topic of bootlegging in the management literature – mainly based on one or a small number of case studies. The research suggests that bootlegging activity can lead to innovative new products and is seen in a positive light by a large majority of authors. However, the existing literature lacks empirical evidence and consensus among different authors on the various aspects of bootlegging such as reasons for bootlegging, underground operation, disclosure stage of bootlegging and its outcomes.

Since bootlegging is a clandestine process, after careful consideration of a variety options, it was concluded that in-depth interviews with bootleggers is the most appropriate approach for studying the topic. Network sampling was applied to identify bootleggers and gain their trust. The researcher has utilised his network and attended several professional and engineering conferences to identify and approach bootleggers rather than contacting them through their managers and organisations. Subsequently, 55 in-depth semi-structured interviews were undertaken. The appropriate research methodology helped to shed light on these under-researched aspects of innovation.

Despite previous research that presented a wide range of reasons for bootlegging; this research discovered that the fundamental element underlining all reasons given for bootlegging is uncertainty (mainly technical uncertainty) surrounding emerging ideas. Thus bootleggers go underground to reduce the uncertainty of their ideas in order to secure official approval for them. It also revealed that the primary motivation for bootlegging is to work on projects that benefit the organisation while personal benefits of bootlegging are identified as secondary motivations; these issues have been overlooked by previous papers. This document presents a framework that clearly demonstrates issues that influence bootleggers' decisions to pursue a project underground.

While previous papers seem to grasp just a small part of whole story with regard to how bootleggers operate underground, this research extensively explains the difference in clandestine operations pursued by bootleggers in different jobs and environments. The study also shows that bootlegging is mainly carried out during work time and is normally mixed with official projects. Although slack resources are the primary source for bootlegging, when they are not adequate, bootleggers divert resources assigned to official projects to their clandestine projects. Based on projects' needs and previous history of working together, bootleggers also approach their colleagues and friends to gather resources, acquire technical expertise and gain their support. This research came up with a unique framework that demonstrates methods applied by bootleggers to operate clandestinely.

This study also makes an important contribution to our understanding of how the bootleg projects are revealed to the wider organisation. This research discovers that bootleggers reveal their bootleg projects in two stages, this issue has not been discussed before in the literature. First bootleggers approach their direct manager if

they get satisfactory results and if they have a good relationship with the direct manager. Bootleggers normally continue to work clandestinely after discussing their project with their direct manager and gaining his/her support. Then, once bootleggers are assured that they are able to convince the decision makers and the project reaches the point where further progress is impossible, they will, finally, present the project to decision makers to get approval and become an official project.

There is a common believe in the literature that bootlegging is a source of radical innovation. The study shows that it seldom results in radical innovation. It also suggests that the most likely outcomes that can be expected from bootlegging are modular, architectural and incremental innovations, rather than truly radical innovations. While previous research neglected failed bootleg projects, this research also demonstrates that even failed projects may benefit organisations by yielding invention, creating knowledge and learning, and solving problems.

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CHAPTER 1:

INTRODUCTION

1.1. Introduction

The purpose of this opening chapter is to present an introduction to this research by indicating its importance, describing the research aims and the research methodology, its contributions to knowledge, and the outline of the thesis.

1.1.1. Layout of this chapter

The next section (1.2) presents a background to this research that highlights its importance. The third section (1.3) discusses the research aims and is followed by section (1.4) that outlines the research methodology. Contributions to knowledge are briefly considered in the fifth section this chapter (1.5). Then, the outline of this thesis is covered in the sixth section (1.6).

1.2. Research Background

The significance of innovation for growth of any organisations – large and small – is an issue that have been studied and discussed by a wide range of papers (Foster, 1986; Leifer et al. 2000; O'Connor et al. 2008). Understanding how innovation is managed has been an aspiration for both academics and practitioners (Peters & Waterman, 1982). Some academics believe that the innovation process is chaotic (Cheng & Van de Ven, 1996; Koput, 1997) and innovation happens when it is not expected (Jewkes et al. 1969). Thus it is not manageable (Aram, 1973; Augsdorfer, 2008) and therefore structuring the innovation process destroys the novel nature of innovation which results in missing opportunities (Gomes et al. 2003; Cunha and Gomes, 2003).

On the other hand, some academics prescribe a series of actions to manage innovation (Cooper, 1990; Kline & Rosenberg, 1986; Constant 2000). Some of these papers consider the innovation process as linear; e.g. Cooper (1990), Phillips et al. (1999), Gorshi & Heinekamp (2002), Ettlie & Elsenbach (2007); while others may see it as a recursive process; e.g. Kline & Rosenberg, (1986), Constant (2000), Leonard-Barton (1988). All these papers ignore inconsistent behaviour and the dynamic structure of innovation; thus they try to structure the innovation process (Cheng & Van de Ven, 1996).

In addition to academia, in some firms, managers seek to make their R&D predictable and more efficient (Andersson & Berggren, 2007). While others; like Google, 3M and HP; give freedom to their R&D staff to spend up to 20 per cent of work time on their own chosen projects in order to stimulate innovation (Iyer & Davenport, 2008). Thus, a lack of consensus over the manageability of the innovation process can be seen among both academics and practitioners.

In addition, the existence of bootlegging – clandestine innovation projects initiated by employees – especially at the early stage of innovation (Koch & Leitner, 2008) makes the innovation process hard to manage (Augsdorfer, 2008). Managers are not able to observe, control and program bootlegging as it is a clandestine, non-programmed, bottom-up and unofficial activity. On the other hand, the recent literature reports a number of innovations – often radical innovations that have resulted from bootlegging; e.g. Toshiba's first laptop (Abetti, 1997a), Toshiba's first Japanese word process (Abetti, 1997b), BMW's 12-cylinder engine (Augsdorfer, 2008) – which emphasise the importance of bootlegging in innovation process.

This subject is critically under-researched, possibly because of the difficulties encountered in studying clandestine activities. Only a handful of papers on this subject can be found in the management literature, yet interestingly all the papers on this subject found it valuable to the innovation process. By studying such underground innovation, this research will try to shed light on features of the innovation process that have not been explored properly and will help both academics and practitioners to have more realistic perceptions of the innovation process.

1.3. Research Aims

Reviewing existing literature on bootlegging, underground innovation and other related subjects, this research finds several gaps in knowledge. On almost all aspects of bootlegging, either there is no empirical research that presents convincing arguments or there are contradictions between different viewpoints and/or research findings.

This research chooses to address four main knowledge gaps which are also the most controversial issues in the literature. These gaps include the decision to bootleg, the dynamics of bootlegging (how bootleg projects are clandestinely executed), the disclosure stage of bootlegging and the outcomes of bootlegging. Addressing these four gaps sheds lights on the four most enlightening aspects of bootlegging that would also help us to explore some of the undiscovered aspects of the innovation process.

Investigating the reasons for bootlegging and disclosure of bootlegging are valuable to understanding the rationality behind the activity. Studying the dynamics of bootlegging shows how much of an organisation's time and resources – if any – are used for bootlegging which is hidden from management eyes. Besides, knowing how bootleggers operate also helps us to understand how they can be influenced, even if it is not possible to manage them. Considering the disclosure stage of bootlegging also helps us to understand when bootleggers reveal their projects, how far bootleggers go underground, what makes them reveal their projects and confirms research findings on reasons for bootlegging. Finally, the outcomes of this activity are important to this research in order to estimate the true value of bootlegging. The only way to judge whether bootlegging truly is a valuable activity is to understand how bootleggers operate – what they use in terms of resources and time – and what their true outcomes

are. Thus addressing these four knowledge gaps goes beyond enhancing our knowledge about these four issues to shed light on other crucial aspects of bootlegging. Therefore, the following four research question will be investigated by this research:

RQ 1. Why do employees choose to bootleg?

RQ 2. How do bootleggers find the time and acquire the resources and expertise to operate clandestinely?

RQ 3. What are the factors that cause bootleggers to reveal their clandestine projects?

RQ 4. What are the tangible and intangible outcomes of bootlegging?

1.4. Research Methodology

This research is based on the realist philosophy and applies a retroductive strategy to explain the invisible underpinnings of bootlegging. Initially, the researcher tried to undertake multiple case studies, however the initial pilot studies demonstrated the need to reconsider the research strategy. Ultimately, it is argued that because the study's focus on bootlegging, as a sensitive research topic (which may alarm or diversely affect participants), semi-structured in-depth interviews is the most appropriate methodology for this research. Networking (snowballing) sampling was necessary as bootleggers are a '*rare and deviant population*' (Lee, 1993), which means there is no list of potential participants available and they are difficult to identify.

Thus, the research was designed based on the considerations required to study sensitive topics with a rare and deviant population; these are common in other areas of social sciences such as economics (e.g. underground economy and tax evasion), sociology (e.g. gay and lesbian issues), and criminology (e.g. drug trafficking, prostitution). Before undertaking the main study, a pilot study of four interviews was undertaken which confirmed the appropriateness of the research methodology and the semi-structured questionnaire.

To execute this research project, it was important to identify bootlegger, invite them to attend interviews and gain their trust to open up and discuss their clandestine activities. Therefore it was important to identify and approach bootleggers through their networks rather than through their organisations and management. First the researcher's personal network was used to gain access to the bootlegger community. In addition, the researcher attended several engineering and professional conferences

and events to gain initial contacts. Over 600 engineers and scientists who work in research, technology development, R&D and product development of different high technology corporations were approached and briefly interviewed in order to identify bootleggers. Among them, 93 bootleggers were identified and contacted to arrange interviews, with only 60 attending for interview which resulted in 55 successfully completed interviews.

In order to analyse the data collected, interviews were transcribed, proofread and entered into the NVivo 8 software which was used to analyse the data. A variety of methods of coding and analysing qualitative data were conducted using Nvivo. As required, some qualitative data were also translated into numerical form to facilitate analysis. This approach, combining qualitative and numerical data, helped to build a comprehensive understanding of bootlegging.

1.5. Contribution to Knowledge

This research makes several crucial contributions to knowledge with regard to different aspects of bootlegging; they shed light on some the most controversial issues and under-researched aspects of bootlegging. These contributions include the following points:

- A variety of reasons for bootlegging can be found in the literature, few of which are supported by empirical evidence, in fact they are often contradictory. This research confirms that some of those reasons include the need to produce a feasibility study, not being able to convince management about the value of the idea, having an immature idea, the need to undertake pre-research activities, and avoid psychological pressure to show promising outcomes from the project. The first contribution to knowledge made by this research is the discovery of an underlying element beneath the various reasons for bootlegging, the uncertainty surrounding an emerging idea. This research explains how this underlying element is interpreted differently for a variety of projects pursued by diverse bootleggers in different environments.

- The motivation for bootlegging is an issue that has not been subject of any previous studies. This research thoroughly investigated bootleggers' motivations to pursue a project underground. Thus it makes another contribution by discovering the primary motivation for the bootlegger is to do work that benefits the organisation and that a secondary motivation is personal benefits, mainly intangible personal benefits such as gaining personal respect and recognition, learning and gaining experience, and satisfaction from innovation.

- Another contribution to knowledge of this research is to identify the criteria for pursuing a project underground. This is also an issue that has been neglected previously. This research demonstrates that prior to deciding to go underground, bootleggers consider certain criteria including: whether they have a good prospect of eventually getting official approval, whether they are able to make enough progress using limited time and resources, how risky the project is and whether they are in a position to assume the risk. The research makes a contribution to knowledge by explaining why bootleggers pursue some projects underground whereas they may drop others or present them to management with no preparation.

- While the existing literature has a little to offer in regard to the disclosure of bootlegging, this research makes a significant contribution by presenting a model that explain why and how bootleggers reveal their bootleg projects. This research identified two steps in the process of revealing bootlegging, first approaching the direct manager and second presenting the project to the decision maker who would approve or reject the project. It also clearly demonstrates elements that influence bootleggers' decisions to reveal their project in each step, which gives us a comprehensive understanding of bootlegging disclosure. In addition, this thesis elucidates exceptions in which the first step is eliminated or the two steps merge.

- Another area to which this research makes a contribution is on the outcomes and benefits of bootlegging. It asserts that innovations resulting from bootlegging mainly have the characteristics of incremental innovation. The thesis highlights that bootlegging seldom produces radical innovations rather it predominantly produces incremental, modular or architectural types of innovations. In addition,

in contrast to previous research, this research identifies several failed bootleg projects that fail to result in any innovation despite this being their primary purpose. It is shown that often this type of failed bootleg project has other benefits for their organisations such as invention, knowledge creation and learning and problem solving.

- Several papers highlight bootlegging as an activity that occurs at the early stage of innovation. This research makes another important knowledge contribution by showing that bootlegging occurs throughout the innovation process and is not limited only to the early stages. The thesis identifies three types of bootleg projects based on their original ideas and their relationship with ongoing business and projects in the organisation. The first type of bootlegging, normally new ideas highly related to the ongoing business, occur at early stage of innovation – this is the type most frequently discussed in the literature. The second type – projects that are part of an ongoing official project – occurs throughout the new product development process and the third one. The third type – pursuing previously completed or abandoned project – was observed even after the new product development process had been completed.

- How bootleggers operate clandestinely and how they gather their projects' requirements has been touched upon in previous papers however there is a lack of empirical evidence and consensus among them. This research contributes to knowledge by demonstrating bootleggers use a variety of methods to gather the required resources. They use slack resources. However if they are not adequate, they may divert resources assigned to official projects to their clandestine projects. They also may approach their colleagues and their direct manager to get required resources. This research also justifies the differences in underground

operation for a variety of projects pursued by different groups of bootleggers. Besides, a model is presented that explains in detail how different bootlegging requirement are gathered and how bootleggers operate underground.

- In regard to underground operation, specifically whom bootleggers approach and how they decide to approach them, this research has made another contribution to knowledge. This is an issue that has been touch upon by only one other researcher and this research presents enhanced information. It demonstrates that interviewees approached their colleagues, friends and outsiders to get the required resources, expertise and support. They approach people primarily based on the bootleg project's needs and previous experience of working together which determines the experience and trustworthiness of the contacts. This research also extensively discusses different roles that other participants play. These issues have barely been discussed in the literature.

- In general, papers on bootlegging have positive attitude toward it, however they do not present the clear advantages of bootlegging compared to official projects based on empirical data. This research makes a significant contribution to knowledge by comparing bootlegging to official projects and presenting several advantages for bootlegging, including: not facing bureaucratic boundaries; freedom to explore different directions that cannot be tried officially; not facing interruption and distraction specially from management; being more exciting, challenging and/or innovative than official projects. Although some of these points are mentioned in the literature as the reasons for bootlegging, this research highlights these points as the advantages of bootlegging over official process and clearly distinguishes them from the reasons for bootlegging.

- In contrast to previous studies that have ignored the limitations and drawbacks of bootlegging, this research discovered several drawbacks to bootlegging compared to official projects i.e. resource limitation, lack of managerial support, getting managerial buy-in, assuming risk and responsibility, taking longer and time limitation, difficulties in approaching those who have the required expertise, waiting time and not having a result if the project fails, and lack of direction. Despite previous research overlooking these limitations, this research emphasises that these limitations often become too problematic and influence bootleggers' decisions to reveal their projects.

1.6. Outline of This Thesis

The next chapter (Chapter 2) forms the theoretical background required for this research by primarily covering the literature on bootlegging, underground innovation and skunk works. As required to form a strong background for this research, the chapter also looks at a wider range of management literature such as new product development processes, fuzzy front-end of innovation, creativity and idea generation, and ambidexterity literature. There are also some areas of management literature that briefly discuss bootlegging; including intrapreneurship (internal entrepreneurship) and strategy and behavioural theory; those viewpoints are also reported in this chapter. Chapter 2 concludes by identifying several knowledge gaps and explaining why this research chooses four research questions to answer.

Chapter 3 covers the methodology and design of this research project. It starts by explaining the research philosophy and strategy. The choice of method used for data collection and sampling is discussed and justified in this chapter. The chapter also discusses pilot studies undertaken for this research, units of analysis, research quality (as a qualitative piece of research) and data analysis.

The thesis continues in chapter 4 by presenting the research findings that prepare the background required to build strong research discussions in the following chapters. It covers the interviewees' characteristics; their environments (including the characteristics of their industries, organisations, departments and units); their work, responsibilities and the circumstances in which they work; and their bootleg projects. It includes all the differences and similarities among interviewees, their environment and work and responsibilities that would influence bootlegging.

The first discussion chapter (Chapter 5) answers the first research question. It describes what happens when interviewees come up with a new idea by discussing the early steps they normally take. Then, it discusses reasons proffered by interviewees for bootlegging. The chapter continues by explaining motivations for bootlegging and interviewees' concerns and criteria for pursuing a project underground. Chapter 5 ends by presenting a framework that explains the elements that influence interviewees' decisions to bootleg.

Chapter 6 sets out to answer the second research question. This chapter first covers the time used for bootlegging. It indicates when interviewees bootleg and the amount of time they spend on bootlegging. It also considers the resources used in bootleg projects including the types of resources used, and more specifically how interviewees gather the required resources. The number of people who participate, roles they play and how they are chosen by interviewees are also covered in this chapter. This chapter in addition expands on the pros and cons of bootlegging process vs. official process.

The third and fourth research questions are answered in Chapter 7. This chapter first expands on different steps towards revealing bootleg projects and the variety of elements that influence the decision to take each step. It also discusses exceptions and circumstance in which bootlegging is either not revealed or revealed in unexpected ways. The chapter then continues by discussing the types of innovation that result from bootlegging and the outcomes of bootleg projects that do not result in innovation.

The final chapter (Chapter 8) primarily presents conclusions of the research findings and discussions concentrating on the four research questions. Then, it extensively discusses this research's contribution to knowledge. This chapter continues with the

research's practical implications for both academia and management. Finally the chapter comes to its end by suggesting areas for further research.

The appendixes of the thesis covers a variety of issues that are used as support for some of the arguments presented throughout the thesis. This section begins with Appendix I outlining the initial research design, its limitations and why it was revised. Appendix II presents the final version of the interview questionnaire which was used to carry out the semi-structure interviews for this research. This is followed by Appendix III which presents a coding sample. Appendix IV covers the research limitations and ethical implications of this research. Then, Appendix V presents research findings on the degree to which interviewees pursued their ideas and projects after getting them explicitly rejection by management. It presents the ability and willingness of interviewees to operate against their managers' decisions. Characteristics of bootleg projects pursued by interviewees within the last two years prior to interview are covered in Appendix VI. Then, Appendix VII presents the evaluation of costs of bootleg projects for their organisation are discussed in detail with interviewees. Finally, Appendix VIII covers the outcomes of the various bootleg projects pursued by interviewees in last two year that were not thoroughly discussed by interviewees.

CHAPTER 2:

LITERATURE REVIEW

2.1. Introduction

Bootlegging – the subject of this research – is critically under-researched, possibly because of the difficulties encountered in studying clandestine activities. This calls for a comprehensive review of a range of management literature to form the theoretical background required for this research. Prior to discussing the literature, it is important to have a clear definition of bootlegging and other related terms that are alternatively used to refer to bootlegging in the management literature. Therefore, after presenting the layout of this chapter, this section defines bootlegging and other relevant terms.

2.1.1. Layout of this chapter

The following two sections (2.2 and 2.3) of this chapter cover the academic papers focused on bootlegging and underground innovation as the main subject of research. The fourth section (2.4) discusses the literature on skunk works. The fifth section (2.5) reviews a wider range of innovation literature. It starts by looking at different approaches to managing new product development (NPD) processes and considers how they accommodate bootlegging. This section also covers the literature on the fuzzy front-end of innovation, creativity and idea generation literature, and the rest of the innovation literature that briefly discuss bootlegging. The theoretical background for this research is not limited to innovation, NPD and creativity as the sixth section (2.6) considers even a wider range of literature that has discussed bootlegging including intrapreneurship (internal entrepreneurship) and strategy and behavioural theory. Then this chapter continues with the seventh section (2.7) discussing ambidexterity theory, which appears to promote the use of the principles of skunk works and permitted bootlegging across the entire organisation (not just for R&D

purposes). The chapter summary – section 2.8 – includes two sub-sections. First, it presents a summary of the literature review and identifies several knowledge gaps. Then, it argues why the four most controversial knowledge gaps are chosen to be addressed by this research and presents applicable research questions.

2.1.2. Bootlegging definitions

Philologically, the term *bootlegging* originates from the illegal production, transport and sale of alcohol, particularly whisky (Augsdorfer, 1996), in the late 19th century in the US. In the management literature, the term was introduced by Knight (1967), who defined it as the covert development of new ideas by innovators in order to protect themselves from "*disapproving power in the organisation*". For the purpose of this research, bootlegging is defined as unauthorised projects initiated by an employee and directed toward innovation for the benefit of their organisation[1]. These projects are normally clandestine and as Augsdorfer (1996) highlights they are *"unbudgeted", "unofficial"* and "*non-programmed"*. Therefore, organizations' time and resources are utilized – without managerial approval – to pursue bootleg projects. They are also "*bottom-up*" project, since they are initiated by someone low in the research hierarchy (Daft, 1978). For the purpose of this research, not all clandestine activities such as quick initial pre-research activities (e.g. gathering information and reviewing literature, previous researches and patents) are considered to be bootlegging. Therefore the bootlegging considered to begin when the bootlegger goes beyond such

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[1] Augsdorfer (1996) defines bootlegging as "*research in which motivated individuals secretly organise the innovation process*". For the purpose of this research, a comprehensive definition of bootlegging presented that would not be limited to "research projects" but include a wider range of employees' activities especially product development attempts.

initial activities and starts to use significant amount of organisational time and resources to pursue his/her clandestine projects. It ends when the bootlegger approaches the decision makers in their organisation to get official approval for the project and it consequently becomes an official project.

In the management literature, an alternative term for bootlegging is *underground innovation* (*underground R&D*), which was originated by Aram (1973) to refer to informal research and development activities which managers are unaware of. Other terms are also used to refer to bootlegging in the literature and within organisations. These include: *work behind the fume cupboard*, *free lance work*, *under the counter work*, *illicit research*, *renegade work*, *work in the shadows, intrapreneuring*[2] (Augsdorfer, 1996), *pet-project* (Nohria and Gulati, 1996)*, under the table work* (Abetti, 1997a), *Friday afternoon work* (Grimpe, 2006), *self-organisation* (Koch and Leitner, 2008)[3], and *scrounging* (Peters, 1983).

There are two other terms, *skunk works* and *permitted bootlegging*, that must be distinguished from bootlegging although they are confused with bootlegging in the literature. The concept of skunk works, first originated by Kelly Johnson during

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[2] Intrapreneurship is another concept commonly confused with bootlegging in management literature. Entrepreneurship behaviour inside an organisation is called intrapreneurship (Menzel et al. 2007). Only intrapreneurial behaviour undertaken informally without managerial authorisation can be regarded as bootlegging.

[3] To define self-organisations, they refer to Dooley's (2002) interpretation in which '*new emergent structures, patterns, and properties arise without being externally imposed on the system. Not controlled by a central, hierarchical command-and-control center, self-organisation is usually distributed throughout the system*'. Besides, self-organisation is initiated by one or a small group of employees and is fairly clandestine operations without managerial permission (Koch and Leitner, 2008). Not only is the self-organisation concept very close to bootlegging but also, as mentioned by the Koch and Leitner (2008), their findings parallel Augsdorfer's findings.

World War II in the Lockheed Martin Corporation, refers to a research project in which a small group of experts work together secretly to solve a given problem (Rich and Janos, 1994). The project is hidden from the rest of the organisation but supported by a senior manager (Pace, 1992). This approach allows the group to operate outside of the bureaucratic system and deliver projects in less time with better quality (Rich and Janos, 1994). Skunk works and bootlegging are clandestine activities; both are unofficial and hidden from a large part of the organisation. However, they are different in terms of the level of management awareness and support involved[4].

Permitted bootlegging is a type of unofficial project pursued by a proportion of employees (usually between 10% and 20%) assigned to pursuing personal interests and ideas (Augsdorfer, 1996). Nowadays firms – such as 3M (Krogh *et al.* 1988; Mitsch, 1992), Google (Iyer and Davenport, 2008), HP, GE, Hewlett-Packard, Digital Equipment, and Johnson and Johnson (Peters, 1983) – allow researchers to spend a specified amount of their time working on personal projects. Augsdorfer (1996) specifically calls this permitted bootlegging to distinguish it from the concept of bootlegging. In this research, it must be distinguished from bootlegging, as it might not necessarily be clandestine and unauthorized and therefore serves a different purpose.

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[4] Skunk works is also used by Peters (1983) to refer to the practice of internal entrepreneurship through the hidden structure of an organisation. This definition seems to be a description of bootlegging rather than skunk works. According to Abetti (1997a), Pearson (1997) and Augsdorfer (1996); Peters (1983) starts confusion in the literature between bootlegging and skunk works which is followed by a number of papers; e.g. Trott (1998), Dickson *et al.* (1991), Hellstrom and Malmquist (2000), Nijhof *et al.* (2002) and Andersson and Berggren (2007).

Finally, it must be borne in mind that this research focuses on bootlegging (underground innovation) as unauthorised[5] and clandestine activities initiated by one or few employees and directed toward innovation to benefit of their organisation. The criterion that distinguished bootlegging from other clandestine activities is that bootlegging is carried out for the interest of organisations. Therefore, "moonlighting" – using the organisation's resources to pursue a personal interest – is not the focus of this research. This must be distinguished from bootlegging as it is not tolerated in any organization. Table 2.1 briefly presents the terms introduced and their relevance to this research. The chapter continues with the following section covering the literature on bootlegging.

Table 2.1: Different terms used for referring to various unofficial activities of employees			
Terms	Substitutes	Definition	Relevance to this research
Bootlegging	Self-organisation, work behind the fume cupboard, free lance work, under the counter work, illicit research, renegade work, work in the shadows, intrapreneuring, pet-project, under the table work, Friday afternoon work	Unauthorised and clandestine activities of employees directed toward innovation to benefit the organisation. Bootlegging begins when the bootlegger goes beyond activities such as quick initial pre-research and starts to use significant amount of organisational time and resources to pursue his/her clandestine projects. It ends when the bootlegger approaches the decision makers in their organisation to get official approval for the project and it consequently becomes an official project.	This is the main topic of this research.
Underground innovation	Underground R&D	Informal research and development activities which managers are unaware of.	This significantly overlaps with the main subject of this research.
Skunk works	Structural ambidexterity	A research project in which a small group of experts work together secretly to solve a given problem with a senior manager's connivance.	There is confusion in the literature between bootlegging and skunk work.
Permitted bootlegging	Contextual ambidexterity	Personal projects pursued in a proportion of time that is given nowadays by firms to allow researchers to work on their interest.	This is a strategy for managing innovation. This is not an activity carried out by employees on their own initiative.
Moonlighting	-	Using the organisation's resources to pursue personal interest or financial gain (Augsdorfer, 1996).	This is not studied in this research.

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[5] In this research, clandestinity characteristics of bootlegging refer to the fact that bootlegging is hidden from a large part of the organisation, particularly senior managers and decision makers. In the case that a middle manager may know that an unauthorised project is going on, still a large part of the organisation, particularly senior managers and decision makers do not know about the existence of these projects. Therefore they are considered to be clandestine.

2.2. Bootlegging

There is little research on bootlegging in management literature; just 7 papers[6] focus on this subject as their main area of study. All these papers are discussed, from the earliest study of bootlegging in management literature to the most recent research.

As was mentioned before, the term bootlegging was first used in Knight's (1967) paper that discusses the process of inter-firm innovation as a change process in organizations. He highlights that innovators need not just an idea or the desire to innovate but also the power to enact change. The power might come from either the innovator or those who support his idea. Those innovators who are at lower level of organisation hierarchy and do not have any '*formal organizational power*' rely on informal mechanisms such as bootlegging (Knight, 1967). He believes that bootlegging challenges the current organization and gives rise to change. He also emphasises that lack of managerial control or weak managerial control are the bases of bootlegging (Knight, 1967). Unfortunately the author does not present any empirical evidence for his arguments.

The first empirical paper by Augsdorfer (1994) comprises case studies of 24 new-technology based firms in the UK. His findings identify three different dimensions of

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[6] There are two other papers by Augsdorfer (1993) and Pearson (1994); both were presented at NTBF conferences in Manchester but, unfortunately, they are not accessible. Neither the British library nor Manchester Business School have a copy of these papers. Therefore Cranfield University library could not acquire these papers. I also contacted the authors to get copies; unfortunately I have received no response to date.

bootlegging. First, in terms of resources used by bootleggers, he finds that slack[7] is crucial to bootlegging. Then he ranks the purposes of bootlegging from most to least important thus: (i) '*quick experiments to show feasibility*', (ii) '*preparation of proposal*', (iii) '*development of a prototype*', (iv) '*pre-research*'[8], and (v) '*purely scientific use*'[9]. Augsdorfer concludes that, apart from a small proportion of research which is conducted in pursuit of scientific curiosity, most bootlegging serves organisational interests by reducing technical and market uncertainty.

He also studied managers' formal and informal responses to bootlegging, classifying them into five categories which are shown in Figure 2.1. Each response influences the process and results of bootlegging differently. Some managers reject bootlegging both formally and informally, wanting to have a fully transparent organisation. So bootleggers are under pressure and bootlegging might be impossible. A second group rejects bootlegging formally, but accepts it informally, turning a blind eye to bootlegging. These managers recognize the benefits of bootlegging and assume bootleggers can play a problem-solving role. The third group accepts it formally but rejects the practice informally. Although they accept it, they keep employees too busy to be able to bootleg. In such cases, bootleggers might mix up their interesting projects with their given tasks or bootleg in their own time. A fourth group accepts bootlegging both formally and informally, seeing it as a source of innovation, and

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[7] Organisational slack is the difference between the total available resources and the total essential resources required to operate (Cyert and March, 1992). The innovations that are not funded by tight budgets and result from slack resources are called slack innovation (Simon, 1976).

[8] '*Pre-research*' is defined by Augsdorfer as early research applied to put together a proposal that would be submitted to the decision makers in the company.

[9] This group of research projects results in an academic paper but they are not directly related to the company core business (Augsdorfer 1994).

their employees are not closely supervised. This is the perfect environment for

bootleggers to pursue their own interests. Finally, there are those managers who

cannot decide whether to accept or reject bootlegging since they are uncertain about

the potential benefits and unpredictability of such research. Some bootleggers may be

happy in such an environment, while others feel insecure (Augsdorfer, 1994).

Figure 2.1: Managerial attitudes toward bootlegging

Source: Augsdorfer (1994)
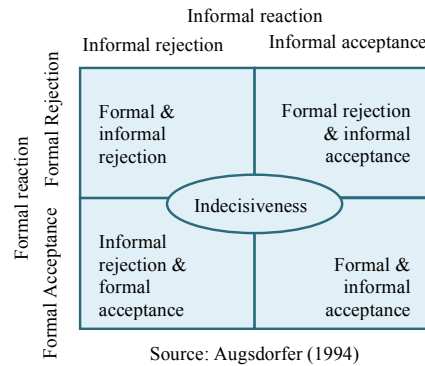
Augsdorfer's work is problematic. Unfortunately the method of data collection is not

explained, for instance it is not made explicit in Augsdorfer (1994) whether he is

talking about senior managers or R&D managers[10]. Besides it is not clear whether his

findings about the purposes of bootlegging and how it benefits organisations are

based on employees' statements or any other evidence.

Augsdorfer's (1996) book, *Forbidden Fruit*, is one of the most comprehensive studies

of bootlegging. It comprises case studies of 57 companies from different industries

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[10] As similar findings are presented in Augsdorfer (1996), in which study the author emphasizes that only R&D managers were interviewed, the 1994 findings might also be restricted to R&D managers' attitudes towards bootlegging.

(24 English, 17 French and 16 German). To collect data, the author interviewed R&D managers and a few researchers in each organisation.

Findings of Augsdorfer (1996) can be summarised as follows. First, bootlegging is not in conflict with the firm's strategy. Bootlegging is a way of preparing an idea and building up a strong case before presenting it to managers. Almost all bottom-up research starts as bootlegging, undertaken to gather the evidence needed to persuade the decision makers. Second, having a funding system that does not permit experimental trials increases the chances of bootlegging. Third, tight managerial control creates pressure and reduces slack, eliminating the chance of bootlegging. Fourth, he discovered that although managerial control over bootlegging is limited, other elements such as organisational culture and colleagues' informal supervision seem to be more influential. Fifth, the issue of resources is less significant to bootleggers than the issue of time. In addition to slack time, bootleggers find time for their activities from a number of sources, including: out of working hours, their lunch breaks, interacting less with colleagues to save time, cutting down on time spent on other activities (e.g. administration, meetings, educational training and conferences).

Over 80% of the corporate organisations in Augsdorfer's (1996) research disclosed the existence of bootlegging[11]. On average, in Augsdorfer's (1996) sample, 5 to 10% of researchers – a '*special species*' – bootleg, he calls them '*entrepreneurs*' [12]. On

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[11] There may be various reasons why its existence was denied by the rest of the sample, such as pretence, lack of awareness, and fear of negative consequences.

[12] They are called '*entrepreneurs*' by Augsdorfer since they have entrepreneurial characteristics. If they leave the company, the number of bottom-up ideas declines. Career promotion and starting up spin-off businesses are not motivations for most bootleggers, whereas following one`s personal curiosity seems to be very important (Augsdorfer, 1996). Bootleggers are not necessarily good at developing products;

average, they spend 10% of their time bootlegging [it should be borne in mind that, for reasons that will be discussed below, these average values are subject to statistical error]. Thus he concludes that overall just about 1% of research time is spent in this way.

In addition, Augsdorfer found that 5 to 10% of researchers initiate bootleg projects and – apart from another 5 to 10 % who never engage in bootlegging – the rest of the employees may participate to bootleg projects from time to time. Therefore concluding that only 1% research time is spent in bootlegging is not valid. Obviously calculating bootlegging time and the percentage of bootleggers needs to be studied by reliable statistical methods which can be implemented through quantitative research.

No significant differences between firms in France, Germany and the UK were found in terms of number of bootleggers or time spent on bootlegging activities. Nor was the type of organisation they were in, in terms of organisational culture and managerial control, a concern for real bootleggers.

These are the concerns about the statistical validity of Augsdorfer's (1996) results. First, it is not clear how he was able to estimate the percentage of bootleggers among researchers by interviewing only a few researchers in each R&D department. If he had based his estimation on R&D managers' responses, his numbers would still not have been reliable, because the whole point of bootlegging is to hide from management sight. Second, respondents' fear of the possible negative outcomes of revealing such information, and a lack of trust between interviewer and interviewees, might have had an impact. It might also have been difficult to distinguish between

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they are superior in terms of coming up with new ideas. They often lose interest in a project after initiating it (Augsdorfer, 1996).

projects - to tell '*where one project stops and where another one starts*' - or to separate bootleg projects from official ones. As Augsdorfer acknowledged, a considerable number of people engage in underground activities in a small way, but only a few go on to pursue significant projects. Besides, since the secrecy of bootleg projects is relative, the influential elements vary from project to project. The author also admitted that the results might have been influenced by respondents' tendency to show off and exaggerate.

At management level he interviewed R&D managers only, subsequently generalizing from their perceptions and attitudes and taking them as indicative of the attitudes of senior managers and even the organisation as a whole. Obviously there are clear concerns in this regard since R&D managers and senior managers may have very different understandings of the innovation process. Thus, senior managers' attitudes towards and perceptions of bootlegging are expected to be different from R&D managers' attitudes and perceptions, and remain unexplored. In regard to R&D staff, this research does not specify how the interviewees were selected. So it is not clear how Augsdorfer ensured that he was interviewing the right people. Moreover, there is a good chance he overlooked a number of bootleggers by electing to interview so few researchers in each organisation.

The next paper to focus on bootlegging was by Pearson (1997) however it is not based on any empirical studies. The paper covers two general issues related to bootlegging, reasons for bootlegging and opportunity to bootleg. First, the author used the conceptual model (an uncertainty map) – developed in a previous paper (Pearson, 1990) – to categorize different types of and reasons for bootlegging. According to him, when the levels of uncertainty about both means and ends are low; the only reason why someone might bootleg is disagreement with management on the value of

the final products or services. When there is low uncertainty about means but high uncertainty about ends, the bootlegger tries to make use of existing technology to find a new, valuable product or service and to identify a new market. If the goal is quite clear and the market already exists but what is not clear is how to make the product or what to offer to the market, the reason for bootlegging is to find ways of solving these problems. Finally, in the situation where there is a high level of uncertainty about both ends and means, Pearson's only explanation would be that researchers are driven by a psychological need to engage in bootlegging.

Pearson (1997) also discussed the opportunities available for bootlegging. He strongly disagrees with Augsdorfer (1994 and 1996) on the importance of slack resources to bootlegging, highlighting that not only have slack resources been shrinking in recent years, but in many firms R&D official programs now exceed their available resources. In addition, safety and security policies, quality management and accreditation standards like ISO 9000 also tend to limit the possibility of operating outside the boundaries. On the other hand, other changes have taken place that promote bootlegging, particularly in special industries such as the software industry, e.g. the availability of computers and software at home and the ready availability of classified data in databases, online, etc. (Pearson, 1997).

In a more recent paper, Augsdorfer (2005) investigated a sample of 57 firms from the UK, France and Germany and undertook another multi-case study, interviewing R&D directors and a few R&D staff[13]. His main aim was to demonstrate that bootlegging

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[13] It seems that Augsdorfer`s (2005) study was a brief version of his book *Forbidden Fruit*. The 2005 sample was the same as that used in Augsdorfer (1996), and many of the findings and results which had already been presented in Augsdorfer (1996) were again presented in 2005.

benefits the organisations, this he sought to do by considering the purposes and nature of the activity, and by reflecting on the outcomes. In this paper, Augsdorfer reconsiders the purposes of bootlegging, suggesting a quite different ranking from that presented in his earlier paper (Augsdorfer, 1994), as is shown in Table 2.2. He ranks the purposes of bootlegging from most to least important as: (i) '*pre-research*', (ii) '*product or process improvement*', (iii) '*troubleshooting*', (iv) '*new product and process development*', (v) '*purely scientific research*'. He also finds that bootleg projects are mainly revealed once the feasibility of the idea has been proved.

Table 2.2: Purposes of bootlegging	
Augsdorfer (1994)	Augsdorfer (1996 & 2005)
Quick experiments to show feasibility	Pre-research
Preparation of proposal	Product or process improvement
Prototype	Troubleshooting
Pre-research	New product and process development
Purely scientific use	Purely scientific research

In terms of the nature of bootlegging, based on R&D staff statements, Augsdorfer finds that bootlegging is mainly concerned with technological improvement or the application of new technology, also, that most bootlegging can be seen as incremental improvement. It should be borne in mind that if a bootleg project fails, it makes little sense for the bootlegger to reveal it and put him/herself in jeopardy. So there is no information about unrevealed projects or failed projects. It is logical to expect R&D staff to talk about their successes rather than their failures.

Another multi-case study by Augsdorfer (2008) considered 70 firms in the UK, France and Germany drawn from the same industries as those in his 2005 study. As he found in his earlier papers, Augsdorfer (2008) also finds bootlegging in over 80% of corporations. He initially explores the reasons for bootlegging which can be

summarised in the following points. First R&D researchers need permission to develop a bottom-up idea but to get this they need to prepare their idea thoroughly first to stand any chance of it being accepted. Second, R&D budgets are periodically planned (e.g. annually) and assigned to particular objectives. Ideas which appear between planning periods have to be pursued underground. Third, even in rare organisations in which a contingency budget is available for ideas which suddenly emerge, projects go underground to maintain independence and secrecy and to avoid psychological pressure to come up with a result.

Augsdorfer's (2008) findings about the percentage of bootlegger among R&D staff and the time and resources used by bootleg projects confirm his previous findings (Augsdorfer, 1996). Besides, in agreement with Augsdorfer (1996), he mentions two mechanisms which assure the quality of bootleg projects: the informal control exerted by friends, colleagues and customers, and the evaluation methods applied by management after disclosure. Another issue discussed by Augsdorfer (2008) is the outcome of bootlegging – rarely a breakthrough innovation. Furthermore, bootlegging usually stops when researchers have demonstrated the feasibility of their idea (Augsdorfer, 2005, 2008).

To undertake this multi-case research, Augsdorfer (2008) collected primary qualitative data by means of 170 interviews with R&D directors and a few R&D staff who were suspected bootleggers. Given the extensive degree of overlap among his 2008, 2005 and 1996 papers, his recent paper seems to be an extension of his previous research by expanding the sample. Therefore most of those criticisms that were levelled at his 1994 and 1996 papers also apply to his 2005 and 2008.

The final paper to be considered in this section is Koch and Leitner (2008) which is a study of self-organisation[14] in the fuzzy front end of innovation. Not only is the self-organisation concept very close to bootlegging but also, as mentioned by the authors, their findings parallel Augsdorfer's findings.

Koch and Leitner's paper was based on case studies of the new product development process in five medium to large Australian firms operating in the semiconductor industry. They conducted semi-structured interviews with R&D directors, identifying 12 self-organising teams. Two members were interviewed from each team, again in semi-structured interviews.

This research discovers two types of self-organisation which influence new product development. The first is when part of a formal project is carried out by self-organisation. In this case, self-organisation helps speed up the development of the formal project by pursuing it through informal and hidden channels. Secondly, in the majority of cases, self-organisation appears to be the initiator of bottom-up innovation. The self-organised project is pursued unofficially and clandestinely until it reaches the point where progress is no longer possible through the informal system. The authors devised a conceptual model of the self-organisation process, shown in Figure 2.2, which demonstrates how the second type, the most common type, of self-organisation operates.

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[14] To define self-organisations, they refer to Dooley's (2002) interpretation in which 'new emergent structures, patterns, and properties arise without being externally imposed on the system. Not controlled by a central, hierarchical command-and-control center, self-organisation is usually distributed throughout the system'. Besides, self-organisation is initiated by one or a small group of employees and is fairly clandestine operations without managerial permission (Koch and Leitner, 2008).

Figure 2.2: The evolution of a self-organised innovation

Idea generation	Coalition building and networking	Prototyping	Persuasion of key actors	Reaction after top-management decision
• Employees intrinsically look for opportunities to innovate. • Employees take initiative to pursue their own ideas.	• Employees interact with others to gain attention and support for their idea. • Employees with different function and from different departments form coalitions or informal teams to pursue the idea.	• Idea becomes more and more concrete. • Finally, employees start with the informal implementation of the idea (simulation, proto-typing etc.)	• At a certain level, official resources are required for further implementation. • Employees try to persuade top management for their idea to get official support.	• Top management accepts idea – idea becomes official project. • Top management refuses idea – idea will either be cancelled also by team or pursued as secret and unofficial project.

Source: Koch & Leitner (2008)

They also propose the following reasons why self-organised projects are kept secret: protecting undeveloped ideas; being able to escape official duties; pursuing ideas outside the company's strategy and core business; feeling comfortable and not worrying about failure; working outside the permitted field; and reluctance to relinquish their idea to someone else.

2.2.1. Summary of bootlegging literature

So far, this section covers all papers which have made a significant contribution to the debate about bootlegging. Table 2.3 summarises these papers' methodologies and findings. Apart from Knight (1967) and Pearson (1997) that are not based on any empirical studies, the other papers (Augsdorfer 1994, 1996, 2005, 2008; Koch and Leitner 2008) are multi-case studies of different firms. These papers studied bootlegging in the R&D departments of corporations[15].

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[15] No research exists into bootlegging in other corporate functions such as marketing, production etc. Nor have researchers examined bootlegging in small firms.

A variety of reasons for bootlegging – some of which are supported by empirical evidence – presented these papers, include: lack of managerial control (Knight, 1967); a funding system that does not allow experimental trial (Augsdorfer, 1996); disagreement with management; finding a new product or process; solving a problem; psychological needs to bootleg (Pearson, 1997); needing to show the feasibility of ideas to get permission; having an idea which emerged between two planning periods (Augsdorfer, 2008); protecting undeveloped ideas; being able to escape official duty; pursing ideas outside the company's strategy; feeling confortable and not worrying about failure; unwilling to relinquish their ideas to someone else (Koch and Leitner, 2008).

On average, 5 to 10% of researchers – '*special species*' – spend 10% of their time bootlegging (Augsdorfer 1994, 1996, 2005, 2008). It should be borne in mind that these findings are subject to major criticisms and the numbers presented are subject to critical statistical error. Augsdorfer did not find any significant differences in the existence of bootlegging in different industries whereas Pearson (1997) highlights the fact that opportunity for bootlegging varies in different industries.

In terms of bootlegging dynamics, Augsdorfer (1996, 2005) also emphasises the importance of slack for bootlegging while Pearson reasons that slack is not crucial, which highlights a disagreement between the two authors. Different management attitudes toward bootlegging influence it differently (Augsdorfer, 1996). Augsdorfer (1996) also claims that time is the main limitation for bootlegging, so bootleggers mainly reveal their projects when they are able to show the feasibility of their ideas. Augsdorfer's research finding is limited as he interviewed a selection of employees and a R&D manager in each organisation and then tried to generalize his finding to bootleggers and all levels of management.

All these papers agree that bootlegging benefits organisations. Koch and Leitner (2008) claim self-organisation (bootlegging) benefits organisations either by collaborating with official (top-down) projects or initiating bottom-up innovation. Augsdorfer (1994, 1996, 2005) claims that benefits are achieved through technological improvement or the application of new technology. He also believes that bootlegging results in incremental innovation and is not in conflict with the organisation's strategy.

Table 2.3: Summary of papers on bootlegging

Authors	Methodology	Outcomes
Knight (1967)	No research carried out	• Unofficial way of imposing innovation for employees. • Prompted by lack of or weak managerial control.
Augsdorfer (1994)	Case study of 24 firms in the UK. Interviewing R&D managers and a selection of R&D staff. (new-technology based Industries)	• The purposes of bootlegging: (i) *pre-research*, (ii) *product or process development*, (v) *purely scientific research*. • Managerial attitude towards bootlegging (i) *official and unofficial acceptance*, (ii) *official acceptance and unofficial rejection*, (iii) *official rejection and unofficial acceptance*, (iv) *official and unofficial rejection*, (v) *indecisiveness*.
Augsdorfer (1996)	Case studies of 57 companies - 24 English, 17 French and 16 from Germany. Interviewing R&D managers and a selection of R&D staff. Industries: software, computer, electronics, chemical, mechanical engineering, materials and healthcare.	• 5 to 10% of researchers bootleg and spend 10% of their time on bootlegging. They are "special species" who bootleg to pursue their curiosity and fulfill their needs. • Bootlegging results in incremental innovation and does not conflict with official strategy. • Funding system that does not permit experimental trials increases bootlegging. • Permitted bootlegging does not reduce true bootlegging. • Bootlegging is a way to prepare the idea for managers. • Almost all bottom-up research starts as bootlegging. • Bootlegging focuses on the early stage of innovation.
Pearson (1997)	No research carried out	• Depending on level of uncertainty about means and end, the following points explain reasons for bootlegging: (i) *disagreement with management on value of product or service*, (ii) *developing new product or service*, (iii) *problem-solving*, (iv) *psychological need*. • Opportunity for bootlegging varies from industry to industry and from time to time. • Disputes the importance of slack in bootlegging.
Augsdorfer (2005)	Case studies of 57 companies - 24 English, 17 French and 16 from Germany. Interviewing R&D managers and a selection of R&D staff. (from different industries)	• The purposes of bootlegging are: (i) *pre-research*, (ii) *product or process improvement*, (iii) *troubleshooting*, (iv) *new product and process development*, (v) *purely scientific research*. • Bootlegging has clear advantages for organisations and its results meet business needs. • Bootlegging is mainly technological improvement or application of new technology.
Augsdorfer (2008)	Case study of 70 firms in the UK, France and Germany. 170 Interviews with R&D managers and staff. (from several industries)	• Bootlegging exists in over 80% of organisations. *"Bootlegging is the lifeblood of creative organisations"*. • The reason for late disclosure is the bootlegger either feels insecure or wants to feel heroic. • Bootleggers are not interested in technical aspect of business and do not intend to launch a spin-off business. • Bootlegging is not inconsistent with business strategy and mainly results in incremental innovations.
Koch & Leitner (2008)	Case studies of NPD in five Australian firms. Semi-structured interviews were held with R&D directors, and identified staff were interviewed. (in semiconductor industry)	• There are two different types of self-organisation. • First, self-organisation which interacts with formal organisation to carry out elements of formal projects informally and often secretly. • Second, self-organisation that appears to be the initiator of bottom-up innovation. It includes five stages: idea generation, coalition building and networking, prototyping, persuasion of key actors, and reaction after management decision. • Reasons for self-organisation are: to protect undeveloped ideas, to escape official duties to develop the idea, to pursue ideas outside the firm's strategy and core business, to feel comfortable without fear of failure within a personal network, to pursue innovative ideas in a situation that the management accepts, lack of permission to engage in other fields, and fear of relinquishing the idea to someone else.

2.3. Underground Innovation

As was mentioned in the introduction, the terms underground innovation or underground R&D are often used as a substitute for bootlegging. Therefore this section covers the papers on this subject in year order starting with Aram (1973) and finishing with Abetti (2004). As with bootlegging, there are only a limited number of papers on underground innovation. Finally, this section ends with a summary of the papers reviewed.

The study by Aram (1973) examines how underground innovation happens in decentralized R&D departments within a particular organisation. The research is based on interviews with R&D and marketing staff at this unnamed organisation[16]. Unfortunately, no other information is available regarding the research design and methodology. The author identifies several features of underground innovation. First, participants have a mutual respect for each other's ideas and abilities. Second, employees voluntarily cooperate with colleagues from other departments and will even contact customers themselves to get the information they need. In this particular firm all R&D and marketing staff were involved in underground innovation which raises the question whether it can be considered as truly 'underground' innovation. Because of lack of information about this firm and about the research methodology it is impossible to evaluate this claim. Third, employees' top priority is the success of the project, not personal glory. Aram concludes that underground innovation is an unmanageable process. However, he emphasises that underground innovation can be

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[16] The detail of number and type of interviews and how they are executed are not mentioned in the paper.

influenced, supported or constrained. Unfortunately the elements that can affect underground R&D are not discussed.

The next study of underground innovation is Abetti's case study of the development of the Toshiba laptop and Toshiba notebook[17] (1997a). To undertake this research, the author carried out 20 in-depth interviews with 11 engineers, managers and executives who had worked on these projects. Three specific factors helped the Toshiba word processor and laptop projects to be reincorporated successfully into the mainstream (Abetti 1997a): '*Japanese national, social and business culture*', '*the organisational setting and culture of Toshiba*', and '*the personalities and background and business experience of entrepreneurship*'. He concludes from his case study that underground innovation may lead to radical innovation and examples of daring corporate venturing. Unlike Augsdorfer (1996), who believes that bootlegging produces technology-pushed innovation, Abetti (1997a) sees underground innovation as demand-pulled, since the Toshiba laptop project was inspired by informal market research. Since this paper is based on a case study, its findings might reflect circumstances specific to Toshiba or to these products.

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[17] In order to discuss his findings, it would be helpful to review the process of development of Toshiba's first laptop and notebook. After the abandoning of the PC business by Toshiba headquarters, an engineer who understood the market convinced his general manager to collaborate with him to develop Toshiba's first laptop underground in the Ome factory, which was far away from headquarters. Once the laptop was completed, head office accepted it but it failed again. Again through underground paths, the senior vice president of Toshiba Europe agreed to help, selling 10,000 laptops in Europe and 3000 in the USA. Only at this stage were headquarters finally convinced that the new computer business had succeeded. Even after the reincorporation of the PC business into mainstream operations, the innovator decided to go back underground to pursue his next project, the notebook. This time, however, the main reason was to protect the secrecy of the project and prevent rivals finding out about it (Abetti, 1997a).

In addition, Abetti (1997b) describes case studies of the development of Toshiba's word processor and laptop. This paper is based on the author's 30 years experience of working with Toshiba. Comparing these two underground innovations, the author develops a model of technical innovation – shown in Figure 2.3 – combining his previous models (Abetti, 1984, 1985)[18] to explain the process of underground innovation.

As is shown in Figure 2.3, if an employee's idea is rejected by management, s/he has three options (Abetti, 1997b). The most practical one is to stay in the company and pursue the project underground. If s/he chooses to go underground, the employee faces the same challenges that official projects have. Furthermore, s/he must also secure the required resources, which the biggest challenge, through personal networks and slack resources. If necessary, s/he may even steal what is needed. The employee will attempt to develop a prototype and increase the project's feasibility, then s/he waits for a precipitating event to reveal the project. At is shown in the figure, if the project continues to be ignored by management, the entrepreneur might try to implement an unofficial market test. If the project fails, it will be killed. But if it succeeds, and is reincorporated into the mainstream and grows, the entrepreneur may even be promoted.

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[18] Abetti (1984, 1985) offers quite different conceptual models for the process of technological innovation. Figure 2.3 is a combination of both models.

Figure 2.3: The process of technical innovation:
Above-ground (left side) and underground (right side)

Concept Development

R&D Proposal

Approved | Not approved

Go back to routine work

Give up?

Yes

No

Stay?

Yes | No

Spinoff new venture

Start R&D project

Go underground

Receive Mgmt's support

Find sponsor

Utilise assigned resources

Divert resources

Incubation

Incubation

Prototype ready

Prototype ready

Not approved | Abort

Business plan?

Approved

Precipitating event?

No → Abort

Yes

Decision to commercialize

Decision to commercialize

Emerge above ground

Reincorporation into mainstream

Acceptance

Management attitude?

Being neglected

Transition and implementation

Continue to develop internal venture

Failure

Market test?

Success

Success

Market test?

Failure

Abort or restart

Reincorporation into mainstream

Kill

Diffusion and growth

Promote entrepreneurs

Successful new corporate business

Source: Abetti (1997b)

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Abetti's next paper (1999a) traced the development of Toshiba's language word processor[19] using a case study approach. Data was gathered by means of seven half-day long interviews with managers, engineers and directors engaged in the project.

The author also identified several external and internal factors which influenced the development of Toshiba`s word processor[20]. According to Abetti, protecting the project from management interference and overcoming bureaucratic boundaries are the main reasons to go underground. He also stresses the importance of slack resources and freedom to pursue unofficial projects for underground innovation. Clearly there is a significant overlap between Abetti (1999a) and Abetti (1997b).

In another paper, Abetti (1999b) argues that bootlegging is more common in Japan and Korea than in the United States and Europe because employees in the States and Europe can easily leave their company and launch a new business if they have a disagreement with their management.

Besides, the author identified four different management attitudes toward bootlegging: denying its existence and discouraging employees from going

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[19] Briefly, the project was developed by a small group of engineers in their own time. An entrepreneur, who knew what he was looking for but did not have any idea of how to achieve it, did most of the work after 5 p.m. and on weekends, using slack resources. After he convinced his general managers with help from the R&D manager, they transferred the project to the Ome factory, far from headquarters. They were granted permission to spend 10 to 15% of their time and resources on it.

[20] External elements include: unmet market demand; emerging technology; an incident in which two inventors met; the organisation structure in which slack resources are available and people are permitted to pursue unofficial projects; and *the Japanese social and business environment* in which spin off would not normally happen. From Abetti's (1999a) point of view, internal elements include: the transfer of technology from the laboratory to the Ome computer factory was implemented by relocating several members of the project; the innovators had a long-term persistent business vision, a strategy and well-defined goals; the entrepreneurs running the underground project changed roles to become product, executive and corporate champions.

underground, denying its existence but encouraging employees to go underground, accepting its existence but keeping employees too busy to be able to go underground, and finally accepting it and supporting employees going underground. These are very similar to the first four managerial attitudes toward bootlegging discussed by Augsdorfer (1994). Abetti (1999b) only does not recognize the fifth attitude managerial attitudes toward bootlegging, *indecisiveness*, highlighted by Augsdorfer (1994).

He also presents a list of seven elements needed for the success of every underground innovation. These elements are: the underground project must match and have potential benefits for the company's mainstream business; to convince management it needs a potential significant market; the project initiator must have a strategic focus and long-term vision; s/he also has to have entrepreneurial characteristics; availability of slack time and resources and loose control of the division are essential; and finally the project initiator must be able to play different roles as s/he makes progress specially when the project is revealed. Abetti (1999b) is not based on a new empirical study, it just represents some case studies previously discussed in the literature.

Later, Abetti (2004) compares two examples of unofficial corporate venturing: the underground development of the Toshiba laptop and the skunk works project behind the Concorde Alloys. This paper is based on data collected for two previous case studies, Badguerahanian and Abetti (1995) and Abetti (1997a). Comparing these two cases, Abetti (2004) concludes an underground innovation faces the same challenges and obstacles that an official project faces but not the executive supervision and over-managing by headquarters. Instead it confronts other challenges i.e. getting resources, ensuring compatibility with business strategy and reincorporating into mainstream business. Finally, Abetti describes some of the characteristics of internal

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entrepreneurs who go underground, e.g. their willingness to take risk. In general, these characteristics are similar to those mentioned by Augsdorfer (1996) to describe bootleggers.

2.3.1. Summary of underground innovation literature

This section has so far looked at papers that discuss underground innovation. Table 2.4 summarises the papers discussed here, their respective research methodologies, research samples, and their main findings. All the papers reviewed in this section are in-depth case studies of one or two underground innovations, apart from Aram (1973) which is the case study of a firm. This raises concerns about generalisability and validity of their findings.

It seems that there are several disagreements among papers on underground innovation and those which focus on bootlegging. For instance, Abetti (1997a) highlights market pull as the ignition of underground innovation whereas Augsdorfer (1996, 2005) sees bootlegging as technology push types of project.

Abetti – in different papers – emphasises rejections by management, disagreement with management, protecting the project from management interference and overcoming bureaucratic boundaries as the reasons for bootlegging. Some of these reasons do not match those mentioned in previous section by papers focusing on bootlegging.

According to Abetti (1997b; 1999b), those who choose to go underground have to do everything to collect resources e.g. finding sponsors, convincing people to share resources with them, and even stealing resources. Characteristics of these people – e.g. their abilities, expertise and understanding of the market and willingness to take risks – are crucial factors for success of underground innovation (Abetti, 1997a,

1999b). Besides, availability of slack resources and having freedom to pursue unofficial projects significantly help underground innovation (Abetti, 1999a; 1999b). Abetti (1997a, 1999a, 1999b) also emphasises external factors which not only influence the success and failure of underground innovation but also cause underground innovation to occur more regularly in certain organisations and countries more than others.

Briefly all these papers have a positive attitude toward underground innovation. Abetti sees underground innovation as a pathway to developing radical innovation which contradicts Augsdorfer's (2008) findings that bootlegging normally results in incremental innovation. In all the cases discussed by Abetti the underground activity continued even into the production stage of the new product development process and an attempt was even made to sell the product. This is in contrast with Augsdorfer's (1996) finding that bootlegging is normally revealed after feasibility of the idea is proven. To continue with expanding the theoretical background of this research, the next section covers the literature on skunk works.

Table 2.4: Summary of all papers on underground innovation

Authors	Methodology	Findings
Aram (1973)	Case study of an unknown firm. Methods of data collection not mentioned.	• Mutual respect brings employees with different backgrounds and expertise together. • They voluntarily cooperate with colleagues and their top priority is the success of the project, not personal glory. • The underground system included all marketing and R&D staff (multi-functions group). • Underground R&D cannot be managed but it might be influenced.
Abetti (1997a)	Case study of Toshiba laptop and notebook. 20 interviews with 11 people who were engaged in the projects.	• Underground R&D is a method of developing radical innovation. • Three factors guaranteed the laptop's success. *Japanese national, social and business culture, the organisational setting and culture of Toshiba and personalities and background, and business experience of entrepreneurship.* • Market pull ignites underground innovation.
Abetti (1997b)	Case study of Toshiba word processor and Toshiba laptop	• Rejection by the management is the reason for going underground. • A model of technical innovation is developed which explains both underground cases. • Personal networks and slack resources are crucial to underground innovations. • Underground innovation faces similar challenges as official projects do except management interruptions. • The underground projects may go as far as unofficial market test.
Abetti (1999a)	Case study of Toshiba word processor 7 half-day long interviews with managers, engineers and directors engaged in the project.	• Protecting the project from management interference and overcoming bureaucratic boundaries are the main reasons to go underground. • Factors that enhanced underground development of the project include: availability of slack resources; freedom to pursue unofficial projects for researchers; *the Japanese social and business environment;* and opportunity to work away from headquarter.
Abetti (1999b)	Based on his previous case studies including Badguerahanian and Abetti (1995) and (Abetti, 1997a, 1997b, 1999a, 1999b)	• Underground innovation is more common in Japan and Korea than in Europe and the States. • Stressing Japanese culture that raises underground innovation occurrence • Different managerial reactions to underground innovation influence differently on underground innovation. Managers reactions to bootlegging can be divided in four groups: formal and informal rejections; formal rejection but closing eyes on underground activities, formal acceptance but keeping employees too busy to do anything else, formally and informally promoting underground activities. • Presenting seven elements that help underground innovation to succeed.
Abetti (2004)	Comparing two previous case studies; Concorde Allay (Badguerahanian and Abetti, 1995) and Toshiba laptop (Abetti, 1997b)	Underground innovations don't face executive supervision and over-managing by headquarters. However, they face particular challenges including difficulties of getting resources, compatibility with business strategy and difficulties of reincorporating into mainstream business. Entrepreneurs who run underground projects are willing to take risk; create informal networks inside and outside the organisation; find sponsors who are managers or from upper levels of hierarchy; and look for opportunities which satisfy their customers, employers and personal need.

2.4. Skunk Works

This section looks at all the papers which have been produced so far on skunk works – from the earliest to the most recent – and then it offers a brief summary. The review of skunk works literature is important to this research of two reasons. First because there is confusion between bootlegging and skunk works in the management literature. Second, because skunk works is similar to bootlegging in terms of being clandestine and unofficial. Third, applying a skunk works approach by management would increase opportunities for bootlegging by providing employees with freedom and slack resources to pursue bootleg projects.

The first authors to discuss this subject were Peters and Waterman (1982). Their work is based on in-depth structured interviews with 43 corporations that were identified by the authors as successful American companies. There is a wide range of companies in terms of industries and sectors to be found in this book. Unfortunately the authors did not specify who, with what level of responsibilities, they interviewed in these companies.

Peters and Waterman (1982) do not distinguish bootlegging, skunk works and permitted-bootlegging. The only thing that seems very important to them is to give autonomy to people whose responsibility is to innovate in order to practice entrepreneurship and thus come up with innovation. In order for these unofficial attempts to be successful, they underline the importance of giving resources to the champions and supporting them. They also highlight that some of these attempts would fail and that should be tolerated in order to have successes in the future.

Another paper that discusses skunk works is Peters (1983). It promotes skunk works as a '*quick-and-dirty solution*' to stimulate innovation and encourages companies to be willing to go beyond their R&D plans and be flexible. In addition to Lockheed Martin Corporation, it cites that GE, 3M, Hewlett-Packard, Digital Equipment and Johnson and Johnson as taking advantage of skunk works. It also claims that not only are skunk works a quick way to innovate but that they also appear to yield high quality innovations. Clearly Peters (1983) does not distinguish between bootlegging and skunk works, and the issue of authorization or being sanctioned is not discussed in his paper. He sees the characteristics of skunk works as being the use of relatively small groups and unofficial processes, and the creation of a sense of ownership and commitment among those involved. This papers popularised the concept of skunk works in management literature while it is based on interviewing with people from American companies that are identified by the authors as successful corporations, Peters (1983) was not based on any empirical research[21].

Focusing on methods to accelerate New Product Development (NPD), Rosenau (1988) proposes that the skunk works approach reduces the danger of researchers being distracted and speeds up NPD process. However, he emphasises the importance of support and access to required resources, skills and expertise for skunk works. Although the author mentions that he questioned some engineers, this paper is mainly based on his experience rather than empirical research.

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[21] After Peters's (1983) paper on skunk works, there are several papers – i.e. Rosenau (1988), Dickson et al. (1991), Dougherty (1992), Rafii (1995), Evink and Beam (1999), Ma (2002), and Fosfuri and Ronde (2007) – that cited skunk works in Lockheed and/or emphasised them as a way of accelerating the innovation process however they also confuse bootlegging and skunk works.

In another paper that clearly confuses bootlegging and skunk works, Dickson *et al.* (1991) studies interfirm research collaboration. This research is based on case studies of 27 inter-firm research collaboration in three industries: biotechnology, electronic and electro-mechanic[22]. It found skunk works in large organizations – with firm bureaucracy and rigid structure – in electronic and electro-mechanic industries, but not in the biotechnology industry. The main player access to required resources is also found to be crucial for skunk works (Dickson *et al.* 1991). Although the authors use the term skunk works, the reported action is very much close to the definition of bootlegging.

Dougherty (1992) also studies interpretive barriers for product innovation in large organisations. This research which is multi cases studies of 18 new product development projects in five firms is based on 80 interviews with people from different department who involved in these projects[23]. The author believes that in skunk works a new product development group could get isolated, there is a risk that they would not have a proper understanding of production and marketing information and they may not share their goal with other function groups. As a result, the newly developed product may fail.

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[22] Dickson *et al.* (1991) discovers a covert type of collaborative venture – called it skunk works – which is not planned and an employee identifies an opportunity and tries to take advantage of it. This would only be revealed when its benefits for the organization can be proven.

[23] He believes that managing innovation is about managing thoughts and interpretations of the people engaged. He argues that in order to make an appropriate new product, different people who are involved, e.g. technical, marketing, field and production people, must come together to have a correct interpretation of each other's thoughts, works and interpretations. Otherwise, they may end up misunderstanding each other and not be able to use information passed on by other people.

In another paper Rafii (1995) reviews physical collocation in product development, and discusses skunk works as a collocating method and tries to highlight the risk involved in skunk works. The first risk is that skunk works groups develop an isolated culture that hinders reintegration with the rest of organisation. Another problem is that such groups might not share critical information with the rest of organisation which would be a severe problem. This paper is also based on existing examples of skunk work in the literature rather than undertaking empirical research[24].

Skunk works is also applied to furniture company with flourishing development of radical ideas which is studied by Evink and Beam (1999)[25]. Although the authors emphasised that most of concept products developed by the skunk work group are not producible, the actual benefit of skunk works is to change the public image of the company by producing significant amounts of knowledge and information. As for a few other papers discussed in this section, the research methodology for this has not been explained.

Hellstrom and Malmquist (2000) applied a case study approach to look at how a telephone exchange was developed by Ericsson through skunk works. They found that the ready availability of people with a range of expertise, environmental stability and relaxed administration are crucial elements for flourishing skunk works. Hellstrom and Malmquist conclude that skunk works are not only a cheap way to innovate but that they are also quicker and faster than official methods. The authors

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[24] Rafii (1995) tries to warn readers of the risk of skunk works by referring to problems raised in Apple's Macintosh group, in the development of PC in IBM and in the skunk works group in Lockheed.

[25] Skunk works is called "*ideation group*" in this company.

carried out semi-structured interviews with people involved in the project. However since their conclusions were based on a single case study, the results cannot easily be generalized to other cases and organisations.

Ma (2002) considers skunk works as a proactive approach that help companies increase their chances of striking lucky and gaining competitive advantage. He recommends making slack resources available to individuals who are interested in initiating an action or experiment in order to raise the chance of success. However, it should be borne in mind that these activities have a good chance of failing and wasting resources (Ma, 2002). The author emphasises the importance of maintaining a culture and environment that supports innovation and of tolerating underground activities. Ma also highlights that skunk works are often in inconsistent with the firm's strategy and normal practice. It should be highlighted that Ma (2002) attempted to draw out those lessons to be learned from the various cases discussed in the literature.

Nijhof et al (2002) studied skunk works[26] as used in a medium sized Canadian bus manufacturer, New Flyer. The authors find that through skunk works, resources are guaranteed to be assigned only to the most appropriate projects because employees pre-filter ideas. Nijhof *et al.* believe there is little need for slack resources[27]. The authors stress that employees may set unrealistic targets which are unreachable with available resources and within their limited time. The paper is an in-depth case study

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[26] They call it "*innovation through exemption*".

[27] This is because, in the studied firm, employees first get managerial authorization and then undertake any actions. How staff improves the feasibility of ideas and prepares ideas for presentation to the management without slack is not considered in this paper.

of the New Flyer. The authors try to triangulate data by using different methods of data collection: interviews with manufacturing engineers and managers, document analysis and observation. However there is a concern about generalizing the results since they are based on a single case study.

The skunk works approach has been adopted not just to improve new product innovation but also to create new-media art[28]. Here Diamond (2005) found that skunk works minimize bureaucratic boundaries, optimize creativity, facilitate knowledge transfer between parties, and help designers to produce prototypes quickly. Diamond's study was based on interviews with independent artists, researchers and representatives working in British, American and Korean firms.

Another paper worth considering is that by Paxton (2006) which studies past performance on space missions implemented through NASA's Faster, Better, Cheaper (FBC) program, based on skunk works principles. Paxton found that researchers tend to take risks if they are not concerned about the consequences. He also argues that a skunk works approach encourages researchers to establish a cohesive group and share the same vision with the result that they have a high chance of success. However the challenge for managers is to prevent any outside interruption because the secrecy and identity of such a group are fragile (Paxton, 2006). The author highlights the risk of unpredicted failure or accident within skunk works. In terms of research design and methodology, no explanation is given of how data was collected or what research methods were used in this paper.

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[28] New-media art is a set of artworks created by new media technology and computer science which include computer imaging, computer animation, virtual art, etc. (Manovich, 2001)

Having taken a different perspective, Fosfuri and Ronde (2007) see skunk works as a way of responding to the resistance to change shown by production to innovations. The authors develop a probability model to discuss interaction between R&D units, production units and management units. These authors advocate skunk works as an organizational model that prevents R&D departments from choosing too safe a research path and drives them to pursue radical innovation. There are only two conditions: R&D researchers must be motivated, and managers must permit them to pursue their interests (Fosfuri and Ronde, 2007). This paper develops an economic model based on several assumptions which may not relevant to other organisations and environments.

Finally through case studies of two Swedish companies – which submitted a considerable number of patent applications between 2000 and 2004 – Andersson and Berggren (2007) discovered the source of many inventions had been skunk works. They also found that there is still substantial room for *heroes* who surprise their managers with inventions. In both cases, managers valued employees' freedom and sought to give them the opportunity to pursue their own interests. Semi-structured interviews were conducted with 10 managers and 24 inventors who were identified as the most inventive individuals in these two firms. It should be borne in mind that a patent does not necessarily make any profit for the organisation. Therefore it might be argued that, although giving freedom to R&D staff might result in patents and invention, it may not necessarily benefit the firm.

2.4.1. Summary of skunk works literature

This section reviews all papers on skunk works, as it is crucial to form the theoretical framework on this research, Table 2.5 summarises methodology and findings of papers discussed in this section.

A number of papers reviewed in this section are not based on any empirical studies, i.e. Peters (1983), Rosenau (1988), Rafii (1995), Ma (2002) and Fosfuri and Ronde (2007). Peters and Waterman (1982) and Diamond (2005) are interview-based research projects while the rest of the papers reviewed in this section (Dickson *et al.* 1991; Dougherty, 1992; Evink and Beam, 1999; Hellstrom and Malmquist, 2000; Nijhof *et al.* 2002; Paxton, 2006; Andersson and Berggren, 2007) are mainly case studies of one or few organisations or products. Skunk works are observed in a variety of environment and industries from high technology industries to furniture manufacture. Notwithstanding the limitations of this approach, one must acknowledge that they are all in agreement as regards the benefits of skunk works.

Skunk works promote creative thinking and innovation by giving researchers the freedom and opportunity to thrive. They minimize bureaucratic boundaries for innovations (Peters, 1983). In addition, they optimise creativity, reduce distractions for researchers (Rosenau, 1988; Fosfuri and Ronde, 2007) and facilitate the transfer of knowledge, information and expertise inside skunk works (Evink and Beam, 1999). Skunk works capabilities to yield radical innovations are also highlighted in these papers (Evink and Beam, 1999; Peters and Waterman, 1982; Fosfuri and Ronde, 2007). They are also called a fast and cheap method of innovation (Peters, 1983; Paxton, 2006).

On the other hand, these papers often caution challenges and risks of skunk works. They say management should provide researchers with freedom, resources and expertise to maintain their secrecy and isolation (Rosenau, 1988; Ma, 2002; Nijhof *et al.* 2002). Meanwhile, slack resources also seem to be crucial for skunk works (Ma, 2002; Nijhof *et al.* 2002). Several authors warn that it should be borne in mind that there is a risk of failure (Peters and Waterman, 1982; Dougherty, 1992; Evink and Beam, 1999; Paxton, 2006) or of employees setting unrealistic and unreachable targets (Nijhof *et al.* 2002). Other risk of skunk works are developing an isolated culture that prevents them from reintegrating with the rest of the organisation (Rafii, 1995), having a different perception and understanding of product and market (Dougherty, 1992), not sharing information and knowledge with the rest of the organisation (Dougherty, 1992), or missing critical information in the rest of organisation (Rafii, 1995).

As a final note to this section, most of the discussion presented on skunk work can be extended to bootlegging because of two reasons. First, bootlegging and skunk work are similar activities in term of their isolation from the rest of the organisation, and the secrecy of projects. Second, as was explained above, most of these papers' interpretation of skunk works is closer to bootlegging than what was originated in Lockheed Martin, thus they interchangeably use the term "skunk works" to refer to bootlegging.

Table 2.5: Summary of all papers on skunk works

Authors	Methodology	Findings
Peters and Waterman (1982)	In-depth structured interviews with 43 successful American corporations.	• Give autonomy to people responsible for innovation to practice entrepreneurship increase innovation in the organisation. • Significant numbers of skunk projects fail and failure must be tolerated in order to gain innovation. • It is a way to pursue risky projects which do not have clear future.
Peters (1983)	No research carried out.	• Skunk works is the best way of avoiding bureaucracy to stimulate innovation. • This is a quick and dirty solution that yields in quality innovation. • It can be found in different firms including GE, 3M, Hewlett-Packard, Digital Equipment and Johnson and Johnson.
Rosenau (1988)	Based on author's experience and questioning engineers.	• Skunk works approach reduces the danger of researchers being distracted and speeds up the NPD process. • Skunk works group needs to have access to required resources, skills and expertise.
Dickson et al. (1991)	Case studies of 27 interfirm research collaboration in three industries.	• Skunk work is identified as one of four different levels of interfirm research collaborations. • Collaborative research projects run by individuals, called skunk works, can be found in electronic and electro-mechanic industries, but not in biotechnology industry. • It occurs in large organizations with firmed bureaucracy and rigid structure that resist other level of collaborative research. • Such projects are only revealed when they succeed.
Dougherty (1992)	Multi cases studies of 18 new product development projects in five firms. Based on 80 interviews with people involved.	• One risk of isolating people in skunk works group is not to share perceptions about the product and to have a different understanding. • Another risk is lack of transferring information and knowledge between skunk work and the rest of organisation. • As a result, new product development process may fail delivering appropriate product.
Rafii (1995)	No research carried out.	• Skunk works group may develop an isolated culture that hinders reintegration with the rest of organisation. • It may also cause information sharing problem which results in missing critical information in the rest of organisation.
Evink and Beam (1999)	Case study of furniture company	• Skunk works, called "ideation group", has applied to flourish development of radical ideas. • They develop their unique culture that boosts innovative product development. • Most of concept products developed by skunk works are not producible however the actual benefit of skunk works is to change public image of the company. • It is also significant source of knowledge and information which are shared by the rest organisation.
Hellstrom and Malmquist (2000)	Case study of the development of a Telephone exchange. Semi-structured interviews with people involved in the project.	• Availability of people with a range of expertise is crucial to skunk works. • Strong ties with the people who have necessary skills should be established by the key actor. • Environmental stability and relaxed administration are important to the flourishing of skunk works. • Skunk works is not only a cheap way to innovate but it is also quicker and faster than official methods.
Ma (2002)	No research carried out.	• There is a good chance that useful weeds (bootlegging) and skunk works projects fail. • They could be inconsistent with firms' strategy • Organisation need to tolerate useful weeds (bootlegging) and skunk works and be prepared to be more lucky. • Availability of slack resources is important to be able to grasp these types of luck.
Nijhof et al. (2002)	Case study of New Flyer, an Canadian bus manufacturer. Interviews, document analysis and observation methods are used.	• Necessity of convincing management guarantees that resources are designated to the most appropriate projects. • There is little need for slack resources here because in New Flyer employees first get managerial authorization then undertake any actions. • Employees may set unrealistic targets which are unreachable with available resources and within their limit time limit

Authors	Methodology	Findings
Diamond (2005)	Interviews with independent artists and researchers and representatives working in British, American and Korean firms.	• Employees may set unrealistic targets which are unreachable with available resources and within their limit time. • The skunk works approach has been adopted to create new-media art. • Skunk works facilitates knowledge transfer between parties and helps designers to produce prototypes quickly.
Paxton (2006)	Study of past performance on space missions in NASA's Faster, Better, Cheaper (FBC) program.	• Researchers are more likely to be willing to take risks if they do not have to worry about the consequences. • The challenge for managers is to prevent any outside interruption because the secrecy and identity of skunk works are fragile. • For skunk works, there is always the risk of unpredicted failure or accident.
Fosfuri and Ronde (2007)	Based on developing mathematical model	• Skunk works prevent R&D departments from choosing too safe a research path and drive them to undertake radical innovation • There are only two conditions: R&D researchers must be motivated, and managers must permit them to pursue their interest.
Andersson and Berggren (2007)	Case study of two highly inventive firms in Sweden. Semi-structured interviews with 24 inventors and 10 managers.	• There is still substantial room for *heroes*. • Managers valued employees' freedom and sought to give them the opportunity to pursue their own interests. • Skunk works projects were the source of many innovations in their organization.

2.5. Bootlegging in A Wider Range of Innovation Literature

So far the literature on bootlegging, underground innovation and skunk works has been thoroughly reviewed. As previously stated, there is limited literature on this area, therefore in order to form a strong theoretical background for this research, it is necessary to investigate bootlegging in a wider range of innovation literature. Furthermore, there are other areas of literature in which bootlegging, underground innovation and skunk works are discussed, although they are not the main focus. Thus the main purpose of this section is to consider bootlegging in the context of the relevant management literature.

The section starts by looking at different approaches to managing the new product development (NPD) process and considers how they accommodate bootlegging. The literature relating to the early stage of innovation, known as the fuzzy front-end, is then reviewed in subsection 2.5.2, since bootleg projects are often initiated at this stage. During the NPD process, particularly in the front-end phase, one of the main concerns of practitioners and academics is how to get the best out of the organisation's intellectual capital. For this reason, the literature on improving creativity and innovation is also reviewed in subsection 2.5.3. Finally this section is concluded by presenting a summary in subsection 2.5.4.

2.5.1. New product development

In their review of the management literature McCarthy et al. (2006) identified three main approaches to the process of NPD: linear, recursive and chaotic. Applying

McCarthy and his colleagues' (2006) classification, this subsection reviews each of these approaches and discusses whether they apply to bootlegging.

2.5.1.1. Linear approach

One of the most well-known (among academics and practitioners) linear approach to NPD is Cooper's (1990) stage-gate model[29]. Initially, Cooper (1990) identified 5 stages, each ending in a gate at which the gatekeeper – a senior manager – decides to kill or continue the innovation project. Cooper has upgraded his stage-gate framework to address some of the limitations of his model[30]. For instance, Cooper (2008) modified the model further to recognise the facts that some stages might be omitted, the process might move backward and loops are inevitable.

Several criticisms of linear models can be found in the management literature. Linear models such as the stage-gate framework are incapable of explaining the development of the majority of breakthrough innovations (Leifer at al. 2000; McDermott and O'Connor, 2002; O'Connor et al. 2008). Where radical ideas are initiated within the conventional NPD process, strict gates may hinder their development (Sethi and Igbal, 2008). They also fail to take into account the organisational elements that influence behaviours and structures, environmental changes, and the dynamic behaviour of players (Van de Ven et al. 1999; Olin and Wickenberg, 2001; Bonner et

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[29] The focus of linear models is on the structure of the NPD process and linkages between different steps (Muffatto and Roveda, 2000). They are usually inflexible and contain sequential steps. They also incorporate key tasks, managerial impacts, time and cost of NPD, and product consistency (Shepherd and Ahmed, 2000).

[30] Cooper et al. (2002a) upgraded the stage-gate framework, adding a discovery stage to accommodate breakthrough ideas and changing the second stage to emphasise the importance of the enhanced Go/Kill decision (2002b).

al. 2002; Crawford and Di Benedetto, 2008). Clearly, within the linear approach, employee-initiated projects, particularly bootleg projects, have been completely ignored and therefore these models do not recommend any strategies for dealing with bootlegging. Although stage-gate model has been revised several times by Cooper (2002a, 2002b, 2008) and several other authors[31], it is still unable to cope with bottom-up informal projects such as bootlegging.

2.5.1.2. Recursive approach

The most commonly cited non-linear model of NPD is the chain-linked model presented by Kline and Rosenberg (1986). This model includes feedback loops, repetition and connections between research, invention, innovation and production (Kline and Rosenberg, 1986; Constant 2000). Leonard-Barton (1988), who also contributed to this model, identifies several cycles in the innovation process that cause delay.

The chain-linked model represents an improvement on linear models in that it accommodates both market pull and technology push and is more capable of explaining radical innovation (Cheng and Van de Ven, 1996; Constant, 2000). The main limitation of this model is that it ignores inconsistent behaviour and the dynamic structure of innovation (Cheng and Van de Ven, 1996). Bootleg projects are also overlooked in this model. Thus, companies implementing this model also have no strategy for dealing with bootlegging.

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[31] A number of other authors have also contributed to this model, including Phillips et al. (1999), Gorshi and Heinekamp (2002), Ettlie and Elsenbach (2007), Sethi and Iqbal (2008).

2.5.1.3. Chaotic approach

This approach highlights that chaotic behaviours happen during the process of NPD which make the process unpredictable and difficult to manage. It is more sophisticated than the recursive approach as it considers changes in behaviour and the structure of the NPD process[32] (Cheng and Van de Ven, 1996).

Papers from this school of thought recognise the existence of self-organisation (bootlegging) throughout the NPD process. McCarthy et al. (2006) discuss how self-organisation (bootlegging) influences the decision-making process in NPD and agree with Olin and Wickenberg (2001) that rule breaking is inevitable within the NPD process. Koch and Leitner (2008)[33], who focus on the fuzzy front-end of the NPD process, identify two types of self-organisation (bootlegging) which influence both bottom-up and top-down innovations. Therefore, papers favouring the chaotic approach not only highlight the chaotic nature of NPD but also acknowledge the

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[32] Adopting the complexity science perspective by researchers favouring this approach allows them to consider a large number of agents (departments, teams or individuals) that behave in a non-linear manner throughout the NPD process (Holland, 1995). Koput (1997) claims that chaos underpins the innovation process, so it cannot be separated into sequential stages (as seen in the linear approach) since different parts interconnect with each other. Cheng and Van de Ven (1996) concluded that the beginning of the innovation process is neither steady nor random, but chaotic. Brown and Eisenhardt (1997) on the other hand, found out that the innovation process is neither tightly structured and inflexible nor completely unstructured and chaotic. They propose that a form of "semi-structure", as applied within successful companies, can resolve the dichotomy between tight control and chaos. In agreement with Brown and Eisenhardt (1997), Gomes et al. (2003) highlight the natural novelty of the innovation process and claim that this novelty results in opportunities and must not be removed by strict structure. Cunha and Gomes (2003) also suggest a flexible model of innovation, which they call "improvisational", which embraces both chaos and minimal structure.

[33] Koch and Leitner's (2008) paper extensively discussed in section 2.3

emergence of true bootlegging throughout the NPD process particularly within early stages.

One of the early papers in NPD that reported clandestine activities similar to what we call bootlegging is Gleicher (1967) which believes that employees would bootleg when the management consider failure as the employees' incompetence. So when employees need to run an experiment, they have no choice but to bootleg. Thus, lack of mutual trust between employees and their management is a reason for bootlegging (Gleicher, 1967).

Grantham and Readman (2005) who also discuss different approaches to New Product Development emphasise continuing innovation [34]. The authors emphasise that although bootleggers normally pursue incremental innovation, they are not limited to it and they also shift resources to pursue radical innovation. Therefore they help organisations to informally pursue exploitation and exploration in the same time. Grantham and Readman (2005) also highlight bootleggers share their knowledge and information with the rest of the organisation through their networks which benefit the organisation.

The final paper discussed here is Richtner and Ahlstrom's (2006) paper which primarily tries to study the influence of slack on new product development. Reflecting on Augsdorfer's (2005) paper, Richtner and Ahlstrom (2006) identify four different types of slack. This paper concludes that reducing slack would decrease bootlegging

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[34] Grantham and Readman (2005) believe organisations need to apply continuous innovation to succeed in the long term. They mean that organisations must have exploitation and exploration approaches. The concept of exploitation vs. exploration is thoroughly explained in section 2.8 where ambidexterity is discussed.

and therefore it would reduce knowledge creation in the organisation which would ultimately weaken the organisation's capabilities to innovate.

2.5.2. Fuzzy front-end of innovation

The concept of fuzzy front-end[35] (FFE) of innovation was first used by Reinertsen and Smith (1991) to refer to early stage NPD in which the concept is formulated (Koen et al. 2001). In other words, FFE is the stage between first recognition of an opportunity and when the development of a new product is officially launched[36]. There is a disagreement on whether FFE must be structured or not[37]; the existence of bootlegging is placed in the centre this disagreement. A number of papers in this area, specially those focusing on radical innovation or arguing that FFE must not be structured, discuss bootlegging – or similar activities – which occur at this stage of NPD[38].

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[35] Other terms such as "up-front activities" (Crawford, 1980) and "up-front homework" (Cooper, 1996) are also used to discuss the early phase of innovation.

[36] At this stage, uncertainty about the process and the outcome is high (Koen et al. 2001), particularly in the case of radical innovations (Reid and Brentani, 2004). Several papers distinguish the FFE phase from the rest of NPD process, suggesting managers must react differently to front-end activities (Wheelwright and Clark, 1992; Kim and Wilemon, 2002; Boeddrich, 2004; Reid and Brentani 2004; Backman et al. 2007).

[37] Although the majority of papers on FFE focus on the management of front-end activities (Moenaert et al. 1995; Khurana and Rosenthal, 1997; Reinertsen 1999; Rice et al. 2001; Kim and Wilemon, 2002; Boeddrich, 2004; Reid and Brentani, 2004), there is a disagreement on whether FFE must be structured or not (Backman et al. 2007). Most researchers focusing on incremental research, such as Koen et al. (2001), propose models for structuring FFE (Reid and Brentani, 2004). On the other hand, researchers studying radical innovation, such as Nobelius and Trygg (2002) and Nobelius (2004), believe that structuring FFE disrupts the process and reduces the novelty of innovation.

[38] Let's bear in mind that these papers do not study bootlegging and their contribution is often limited to a few paragraphs discussing their observations or understanding of bootlegging.

For instance, Reid and Brentani (2004) show that incremental innovations are usually fostered and structured by organisations whereas radical innovations are mainly directed by individuals who have identified the opportunity or problem. Backman et al. (2007) also found out that some innovations, particularly the radical, developed outside the formal NPD process.

In agreement with them, Salomo and Mensel (2001) argued that initiatives leading to radical innovation are usually set up by individuals. Talke et al. (2006), focusing on the FFE process, conclude that the initiative emergence process[39], as the main part of front-end activities, depends on a range of individual competences. Talke et al. (2006) believe that bootlegging may also benefit the organisation by problem solving as well as through other benefits. As is highlighted by Salomo and Mensel (2001) and Talke et al. (2006), the emergence of initiatives, in the FFE phase, is similar to Augsdorfer's (1996) bootlegging concept. Consequently, it can be concluded that bootlegging is a significant element of the FFE phase of NPD process.

Shepard (1967) sees management support and freedom given to employees by the management as necessary for innovation. He believes that in many firms a considerable number of researchers implement secret projects (bootlegging). In addition he believes that bootleggers understand that they are undertaking risks including the risk of being fired. Unfortunately he doesn't present any empirical evidence for his comments.

In agreement with Shepard, Thompson (1969) also believes that bootlegging – he called it '*illegitimate activities'*– is an important source of innovation. He also

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[39] The concept of initiative emergence discussed in Talke et al (2006) and Salomo and Mensel's (2001) papers is very close to concept of bootlegging.

emphasises that organisational slack is vital for bootlegging to succeed. Thompson (1969) argues that even though managers prefer to be in control of everything going on in their organisation, bootlegging is out of their control which is in line with Augsdorfer's (2008) argument on the manageability of innovation.

It can be inferred from Pearson's (1990) paper, bootlegging occurs when the uncertainty about both the means (how to do the project) and the end (the outcomes of the project) are high. This type of project which is carried out by individuals is initiated when the employee comes up with strange, unpredicted results from unplanned research activities. Thus not only do they result in significant innovation but also they improve the learning process in the organisation. This issue is also pointed out by Meyer (2005) who believes that bootleggers, as initiators of knowledge-building activities, assist learning process in the organization.

In another paper, Brown (1991) would go even further to say that some of the best innovation in corporations such as Xerox come out of bootlegging. In agreement with him, Freeman and Soete (2000) highlight bootlegging as a critical source of radical innovation in organizations. These authors also agree with Augsdorfer (1996) that bootleggers would go underground to be able to promote their ideas at the end of the day.

Finally, Jenssen and Jorgensen (2004) look at bootleggers from a quite different viewpoint and they call them '*champions*'. These champions, from Jenssen and Jorgensen's (2004) point of view, have different ideas from the rest of their organisation. So their tactic for protecting their idea is to hide it from the rest of organisation. They also highlight that bootlegging happens more often in organisations which show resistance to change.

2.5.3. Creativity and idea generation

Creativity and idea generation literature has also discussed bootlegging and permitted-bootlegging from a different angle. Although most of these papers do not focus on bootlegging as their main topic, they have made contributions to the discussion. Thus this subsection reviews creativity and idea generation literature on bootlegging and permitted-bootlegging[40].

Motivating individuals and fostering an environment that promotes creativity and the emergence of new ideas is one of the main concerns in creativity literature. Fostering lots of new ideas within the FFE phase improves the organisation`s chances of success (Boeddrich, 2004). The two most important elements that motivate employees who engage in early stage innovation are intellectual challenge and independence (Sauermann and Cohen, 2007; Amabile and Khaire 2008).

A number of authors – such as Grantham and Readman, 2005; Berends et al. 2007; Amabile and Khaire (2008); Iyer and Davenport (2008) – argue that applying

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[40] Before discussing the creativity literature point of view on bootlegging, it is important to discuss one of the well-known theories of creativity, Koestler's (1964) theory, which can be used to justify bootlegging. Koestler believes over time, people develop perspectives (skills, habits and assumption) which form their way of thinking (thought path). When different thought paths collide with each other, it results in creativity (Koestler, 1964). Organisations, on the other hand, develop structures (rules, procedures, etc.) over time. Expanding Koestler theory, it can be argued once the organisation's structure is challenged by someone with different way of thinking – such as bootleggers – it may result in creativity. Considering Pearson (1997) and Abetti's (1999b) discussion – that employees bootleg once they disagree with their management – and Jenssen and Jorgensen's (2004) idea – that bootleggers have different points of view from the rest of the organisation – help to build on Koestler (1964) theory saying bootleggers can be considered as a source of creativity within the organization since they challenge the organisation's structure and collide with the general thought path in the organisation.

permitted bootlegging; allowing staff to spend a percentage of their time on projects of their own choice, gives employees autonomy and freedom and promotes creativity. It also important to give these employees slack resources to be able to follow their interests (Trott, 1998). It is considered an effective way of increasing the number of innovations (Gaynor, 2002; Iyer and Davenport, 2008) and of advancing radical innovation (Grantham and Readman, 2005; Berends et al. 2007). The well-known examples of organisations benefiting from this approach are 3M (Krogh *et al.* 1988; Mitsch, 1992; Cook, 1999; Farrell, 2005; Roberts, 2007; McNerney, 2007) and Google (Talke et al. 2006; Harper *et al.* 2008; Wang *et al.* 2008; Machlis, 2009). For instance, Iyer and Davenport (2008) highlight that more than 50% of the innovations in Google are bottom-up innovations originated by employees in the 20% of their time they are allowed to spend on personal projects. Trott (1998) also implied that if they are prohibited from pursuing such projects, they would still bootleg; however there is higher chance that they would fail because of the lack of support.

2.5.4. Summary of bootlegging in a wider range of innovation literature

This section has reviewed a wide a range of relevant NPD, innovation and FFE of innovation, creativity and idea generation literature. As was explained, among the different approaches to NPD, the linear approach – which is based on Cooper's stage-gate theory – and the recursive approach – based on the Kline and Rosenberg's (1986) chain-linked model – neglect the existence of bootlegging. Only papers that adopt the chaotic approach to NPD recognise that bootlegging may occur within NPD process. Literature on early stages of innovation – known as FFE of innovation – discusses bootlegging, especially those papers concerned with radical or breakthrough

innovation. Even creativity and idea generation literature refers to bootlegging and/or permitted bootlegging as a way of motivating innovative people, boosting the number of ideas and achieving radical ideas. Table 2.6 (at the end of this section) summarises viewpoint papers from NPD, FFE of innovation and creativity and idea generation literature.

A variety of reasons for bootlegging can be found in these papers, including: tight managerial control (Thompson, 1969); managers supporting underground activities (Shepard, 1967); preventing loss of face with managers; lack of mutual trust between employees and managers (Gleicher, 1967); testing an idea before starting a formal process (Talke *et al.* 2006); the organisation culture supporting underground activities (Granthem and Readman, 2005; Berends *et al.* 2007); working on an idea outside permitted field (Granthem and Readman, 2005) the organisation showing resistance to change; having different ideas from the rest of organisation (Jenssen and Jorgensen 2004); high uncertainty about means and ends (Pearson, 1990); increasing feasibility of the idea and gathering evidence (Salomo and Mensel, 2001); low cost way to reduce uncertainty (Hamel, 2007).

The majority of papers presented in this section emphasise bootlegging capabilities that result in radical innovations (e.g. Freeman and Soete, 2000; Grantham and Readman, 2005; Berend *et al.* 2007; Fosfuri and Ronde, 2007; Amabile and Khaire, 2008). Salomo and Mensel (2001) mention that underground innovation yields both incremental and radical innovations. In addition, Gaynor (2002) and Iyer and Devenport (2008) believe that significant amounts of innovation result from bootlegging. Other issues highlighted in these papers are the advantages of bootlegging, i.e. solving problems (Talke *et al.* 2006), promoting learning processes (Grantham and Readman, 2005) and generating knowledge (Meyer, 2005).

Table 2.6: Bootlegging in NPD, FFE of innovation, creativity and idea generation literature

Authors	Comments
Amabile & Khaire (2008)	• Referring to 3M and Google. • Letting employees pursue their passions (permitted bootlegging) is important for the innovation process. • People who think revolutionary thoughts are those who go underground and develop radical innovations.
Berends *et al.* (2007)	• 'Legitimized' bootlegging or 'Friday afternoon experiments' fertilizes creativity. • Radical innovation is impossible without researchers who exploit new knowledge through legitimized bootlegging.
Brown (1991)	• Bootleggers, "renegades", often come up with the best innovations in the company.
Freeman & Soete (2000)	• Bootlegging often generates radical innovation. • Employees bootleg to promote their ideas.
Galbraith (2004)	• Innovative ideas are advanced through bootlegging. • The less the organisation's culture supports innovation, the more important it is to go underground. • Bootlegging helps to separate innovation from operation in organisations and improves invention.
Gaynor (2002)	• Referring to bootlegging at 3M. • Bootlegging benefits organisations by helping them to come up with quick solutions and maintains innovators' passion • Bootlegging is a significant source of bottom-up innovation.
Gleicher (1967)	• Employees go underground to hide their trial experiments and prevent to loss of face with the management. • Lack of mutual trust between researcher and managers cause employees to go underground.
Grantham & Readman (2005)	• Bootlegging produces new ideas and advances future exploration for the organisation. • Despite crossing boundaries, bootleggers transfer their learning to the organisation. • In organisations with a cultural tendency to explore new idea, there are examples of radical innovations resulting from bootlegging.
Hamel (2007)	• Giving people 'dabble time' – a half day a week to initiate their own project – as a method of democratizing innovation helps to make a firm innovative. • 'Dabble time', permitted bootlegging, is the cheapest way to reduce uncertainties before committing to a new business.
Iyer & Davenport (2008)	• More than 50% of innovations in Google are bottom-up innovations which result from the 20% of employees' time dedicated to permitted bootlegging. • Even managers in Google are permitted and encouraged to spend 20% of their time on related but different innovative projects and 10% of their time on completely different projects.
Jenssen & Jorgensen (2004)	• When the rest of organisation does not share the champion's idea, the bootlegging tactic is chosen to protect the idea. • Bootlegging happens more often in organisations which show resistance to change.
Meyer (2005)	• In large firms, bootlegging assists organisational learning by initiating knowledge-building activities.
Pearson (1990)	• Bootlegging benefits organisations by improving learning. • High uncertainty about means and ends causes bootlegging.
Richtner & Ahlstrom (2006)	• Organisation slack is important for the learning process and creating knowledge. • Reducing slack limits bootlegging which causes decreasing knowledge creation and learning and ultimately reduces innovation.
Salomo & Mensel (2001)	• Bootlegging, 'initiative phase', is a way to increase the feasibility of the ideas. • It results in both incremental and radical innovations.
Shepard (1967)	• Giving freedom to researchers and supporting them to follow their interests is crucial to firms' success. • In many firms, a considerable number of researchers implement secret projects. • Researchers accept the risk of being fired for undertaking such projects.
Talke *et al.* (2006)	• Referring to bootlegging in Google. • It is a way of testing ideas and problem solving before official initiation.
Thompson (1969)	• Significant innovation results from '*Illegitimate activities*' (bootlegging). • Organisational slack is vital for bootlegging to succeed. • Tight managerial control results in bootlegging.
Trott (1998)	• In order to increase creativity, slack must be available for R&D researcher to follow their interest. • Even if the researchers are not permitted to do so, they undertake clandestine activities. • Freedom must be given to them to pursue their interest; otherwise they may fail under pressure.

2.6. Bootlegging in The Rest of The Management Literature

There are other areas of management literature that have discussed bootlegging although it has not been the study subject in these areas. These areas include intrapreneurship, strategy and behavioural theory areas. This section reviews the comments that these groups of literature have made on bootlegging. At the end of this section, Table 2.7 present viewpoints of paper discussed in this section.

2.6.1. Intrapreneurship literature

The first relevant area of management literature that is considered is known as internal entrepreneurship or intrapreneurship. This group of literature makes a limited contribution to the research subject as bootlegging has not been their focus of study.

In agreement with Augsdorfer (1996, 2008), a few of these papers emphasise the importance of slack resources for bootleg projects (Pinchot 1985; Kanter, 2000; Bessant and Tidd, 2007). In terms of the nature of the projects pursued by bootlegging, Burgelman and Sayles (1986) highlight that they are first steps toward ascertaining the feasibility of employees' ideas.

As in different areas of management literature that have been discussed previously, several reasons for bootlegging are proposed in this group of literature. These reasons include: escaping formal orders and breaking rules (Kanter, 1983), revealing ready-made solutions, not having room for intrapreneurs in the formal system (Pinchot, 1985), defining new business (Burgelman, 1983, 1988), funding ideas which emerge

between two funding periods, and funding risky projects (Burgelman and Sayles, 1986; Burgelman, 1988; Kanter, 2000).

In terms of revealing bootlegging, Burgelman (1983) claims that when bootleggers reach the point that they feel their project is understandable to the management; they would go ahead and reveal their project. On the other hand, Pinchot (1988) believes that bootleggers have no reasons to reveal their clandestine projects quickly and therefore bootlegging may take a while to be revealed.

This group of literature sees bootlegging as a source of radical innovation (Burgelman and Sayles, 1986; Roberts, 1991) and even as a way of defining new business (Burgelman, 1988). Only one concern raised by Roberts (1991) which is bootlegging may conflict with the firm's strategy.

2.6.2. Bootlegging in strategy and behavioural theory literature

The final group considered here consists of behavioural theory and strategy literature that briefly discuss bootlegging. Quite similar types of discussion as outlined in previous sub-sections can also be found in this group of literature. For instance, bootlegging is just a beginning for an R&D process in which proof of concept is gathered (Debackere *et al.* 1994). In addition, they emphasise the importance of giving freedom to employees to bootleg in order to maintain continuous innovation (Ryan, 2005).

Besides, different reasons for bootlegging can also be found in this group of papers. These reasons are: managers supporting underground activities (Mintzberg 1990); fear of dominant managers (Roussel *et al.* 1991); becoming a hero (Mezias and Glynn, 1993); having an undeveloped idea (Cyert and March, 1992; Mezias and Glynn, 1993); the idea can not be pursued through formal process (Mezias and Glynn,

1993); the idea can not be easily assessed by the management (Cyert and March, 1992) and increasing the feasibility of the idea and gathering evidence (Debackere *et al.* 1994). Table 2.8 summarises these papers' remarks on bootlegging.

In contrast to the majority of the papers discussed so far, Roussel *et al.* (1991) stress that legitimizing bootlegging in the organisation causes loosening control over resources and shifts them to unknown projects. These authors believe bootlegging challenges the organisation's strategy and might go out of control. This point of view, causes Roussel *et al.* (1991) to have a negative attitude toward bootlegging. Cyert and March (1992), on the other hand, who focus on slack resources emphasise the importance of slack for underground innovation and point out that underground innovation yields breakthrough innovation.

As was mentioned, a summary of the discussions on bootlegging that can be found in the papers discussed in the two parts of this section is presented in Table 2.7.

Authors	Comments
Table 2.7: Bootlegging in intrapreneurship, behavioral theory and strategy literature	
Bessant & Tidd (2007)	• Referring to 3M. • Providing slack, giving freedom to staff to do their job, encouraging bootlegging, turning a blind eye to ways to get around the system and tolerating mistakes are necessary.
Burgelman (1983)	• Bootlegging develops new business. • Once a bootleg project reaches the point that is understandable to the management, it will be revealed.
Burgelman (1988)	• Bootlegging helps to define new business. • Risky projects that could not be followed officially are funded through bootlegging.
Burgelman & Sayles (1986)	• Bootlegging funds ideas that emerged when the official budget is already assigned elsewhere. • Risky projects can be funded informally through bootlegging. • Bootlegging is the first step to show the feasibility of projects and end the chicken-egg problem. • Bootlegging is important in developing foundations to define new business.
Cyert & March (1992)	• The concept of slack innovation, meaning innovations gained from using slack resources, is introduced. • Because an idea cannot be easily assessed, it is developed underground using slack resources. • It improves the technology and the firm's performance, and it may result in breakthrough innovations
Debackere *et al.* (1994)	• Bootlegging is the first stage of a life cycle model of an R&D process – which includes three stages: bootlegging, bandwagon and institutionalisation – for technology-pushed innovations. • Through this stage, pioneers try to gather proof for their work. • Gathering resources is a challenge for bootlegging. • Through the bootlegging stage, the level of effort is low and a small group works on the idea.
Kanter (1983)	• Bootleggers are called 'Lone Rangers'. • 'Lone Rangers' further the innovation process. • In order to escape orders and break roles, employees choose to go underground.
Kanter (2000)	• Many new ventures start from hidden corners of organisations. • Adapting underground innovation in the organisations is a great challenge. • Because the required time and resources are not predictable, the existence of loose resources (slack) is important to bootlegging.
Mezias & Glynn (1993)	• When it is not possible to follow an idea through formal channels, an underground path is taken. • When the quality of an idea is not sufficient to get permission, the idea generator has to pursue it underground. • Wanting to become a hero is a reason to go underground.
Mintzberg (1990)	• Under time pressure circumstances, managers allow employees to implement what they think is necessary. • Trusting employees to do what should be done would work better than making rigid decisions.
Pinchot, (1985)	• Majority of corporate innovations start from bootlegging. • Most formal systems do not have room for intrapreneurs, which drives employees to bootleg. • Bootlegging would happen if enough slack was available. • Revealing ready-made solutions is a motivation to undertake bootlegging.
Pinchot (1988)	• Bootleggers are a small group of employees in the organisation. • Bootlegging is a quite long process and there is no rush to disclose the bootleg project.
Roberts (1991)	• Bootlegging is often in contrast with the firm's strategy. • Bootlegging leads to radical innovation. • To provide hospitable environments for researchers, managers close their eyes to bootlegging.
Roussel *et al.* (1991)	• Although bootleg projects may result in innovation, failed bootleg projects are neither counted nor controlled • If bootlegging was permitted in the organisation, resources would be shifted to unknown projects and management would lose control. • Bootlegging could embrace very broad range of researches which might be in contrast with the firm's strategy and far from its business model. • Fear of dominant managers is a reason for bootlegging.
Ryan (2005)	• Bootlegging is a part of organisation culture. • Permitting people to spend 20% their time bootlegging maintains continuous innovation.

2.7. Ambidexterity

In order to complete the theoretical background for this research, Ambidexterity – which appears to promote the use of the principles of skunk works and permitted bootlegging across the entire organisation (not just for R&D purposes) – is the last issue that is worth considering in this chapter.

The paradox between exploration and exploitation activities, and the difficulties in undertaking both concurrently are critical concerns that have been addressed by a number of researchers in recent years (March, 1991; Burgelman, 1991; Tushman and O'Reilly, 1996; and Ancona et al. 2001). The term ambidexterity was first introduced by Duncan (1976) as a way of describing the "dual structure" an organisation needs to be able to undertake both exploration and exploitation at the same time. The idea is that an ambidextrous structure enables an organisation to achieve both the evolutionary change and the revolutionary transformation which will guarantee its long-term success (Tushman and O'Reilly, 1996; O'Reilly and Tushman, 2004; Probst and Raisch, 2005; Kang and Snell 2009; Wang and Rafiq, 2009).[41]

In the context of innovation, the pursuit of both incremental (exploitive activities) and radical (exploratory activities) innovation is a big challenge, as they require different organisational structures and cultures (Dougherty 1992; Nadler et al. 1997). Tushman and O'Reilly (1996) propose ambidexterity as a method of simultaneously pursuing both radical and incremental innovation.

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[41] Since the concept of ambidexterity was first introduced, discussion of the subject has expanded into various areas of management literature such as leadership, organisation design, organisations learning, organisation adaptation, strategic management and innovation (Raisch and Birkinshaw, 2008).

Ambidextrous organisations separate the unit working on radical innovation from the rest of the organisation (O'Reilly and Tushman, 2004; Smith and Tushman 2005), with the new unit being connected to the rest of the organisation at the senior management level only (O'Reilly and Tushman, 2004; Broring and Herzog, 2008; Raisch et al. 2009). Giving autonomy to this unit's employees increases their sense of ownership and responsibility and encourages risk taking, which in turn strengthens ambidexterity in the organisation (Tushman and O'Reilly, 1996; Broring and Herzog, 2008; Jansen et al. 2008; Kang and Snell, 2009). O'Reilly and Tushman (2004) found that those companies that adopt an ambidextrous approach have been significantly more successful than those that apply other methods.

The type of ambidexterity referred to above has been dubbed structural ambidexterity by Gibson and Birkinshaw (2004) and Birkinshaw and Gibson (2004), since it is achieved by changing organisational structure. Gibson and Birkinshaw (2004) and Birkinshaw and Gibson (2004) also define another type of ambidexterity called contextual ambidexterity. In this approach, units do not need to be isolated from the rest of the organisation; instead, autonomy is given to individuals to manage their own time between "*adaptation-oriented*" (radical innovation) and "*alignment-oriented*" (incremental innovation) activities (Gibson and Birkinshaw, 2004; Raisch et al. 2009). The context – that is the beliefs, processes and systems that form employees` behaviour (Ghoshal and Bartlett, 1994) – helps employees to divide their time between exploitation and exploration (Raisch and Birkinshaw, 2008; Raisch et al. 2009). Contextual ambidexterity is conducted in some organisations, for example Hewlett-Packard, 3M and Intel (Birkinshaw and Gibson, 2004).

Skunk works as an approach is similar to structural ambidexterity; they seem to share the same antecedents, purpose, structure and outcomes. Similar connections, on the

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other hand, exist between permitted-bootlegging and contextual ambidexterity. It should be borne in mind that, while skunk works and permitted-bootlegging are used in regard to R&D functions, the concept of ambidexterity embraces the whole organisation and all types of functions.

2.8. Chapter Summary

This section consists of two main sub-sections. First, it presents a summary of the literature previously discussed and highlights several knowledge gaps in the literature in regard to bootlegging. Then, it justifies the choice of the research gaps that this research is going to address and presents four main research questions.

2.8.1. Summary of the discussed literature and gaps

The existing literature on bootlegging, underground innovation, skunk works and other related issues has been reviewed. There is only a handful of papers that study bootlegging and underground innovation. Therefore, in order to build a strong theoretical background for this research, this chapter looked into other areas of research to see how the relevant literature addresses bootlegging. Consequently, the following areas of management literature are reviewed: NPD process, early stage of innovation, creativity, intrapreneurship, and ambidexterity.

In order to identify knowledge gaps in management literature, this section summarises the issues covered in the literature. Table 2.9, that is presented at the end of this section, indicates aspects of bootlegging discussed by papers which focus on bootlegging, underground innovation or skunk works. This will help to highlight the gaps in knowledge in regard to bootlegging. Finally it attempts to redefine the concept bootlegging that is chosen for the purposes of this research.

2.8.1.1. The extent to which bootlegging exists in different firms and countries

One of the first issues shown in Table 2.9 is the existence of bootlegging which is only studied by Augsdorfer (1996, 2005, 2008). He claims 80% of firms in his samples confirm the existence of bootlegging. His papers focussed on corporate R&D in British, French and German firms from software, computer, electronics, chemical, mechanical engineering, materials and healthcare industries. Although he found firms with a vast number of bootleggers and firms with few bootleggers, he did not find any significant differences between bootlegging in different countries, industries, or organisations with different cultures and managerial styles.

This is in contrast with Pearson's (1997) hypothesis that the availability of computers and software at home and the ready availability of classified data in databases raise the odds of bootlegging in some industries, e.g. the software industry. Conversely safety and security policies which prohibit staff working after official working hours significantly decrease the chance of bootlegging for some other industries (Pearson, 1997). Abetti (1999b), on the other hand, mentions that because of cultural differences, Japanese employees choose to go underground more than USA employees do. Therefore there is disagreement as to whether the extent and the nature of bootlegging are different in different industries and countries; this highlights a gap in the literature. Further research may contribute to this issue by undertaking a sample from different firms from various industries in different countries.

2.8.1.2. Characteristics of bootleggers

As is shown in Table 2.9, identifying bootleggers and specifying the characteristics of those who go underground are other issues considered by Augsdorfer (1996) and

Abetti (1997b, 2004). Augsdorfer says 5 to 10% of researchers who initiate bootlegging are '*special species*'[42]. These employees are very motivated and creative employees who are willing to undertake risk (Augsdorfer, 1996; Abetti, 1999b, Abetti 2004, and Andersson and Berggren, 2007). They have entrepreneurial characteristics and are called entrepreneurs by Augsdorfer (1994, 1996, 2005, 2008), Abetti (1997a, 1997b, 1999a, 1999b, 2004), Hellstrom and Malmquist (2000), Andersson and Berggren (2007) and Koch and Leitner (2008). Among these papers, only Augsdorfer (1994, 1996, 2005, 2008), Abetti (1997a, 1997b, 1999a, 1999b, 2004) and Koch and Leitner (2008) are based on empirical evidence.

2.8.1.3. Reasons for bootlegging

The third subject that is discussed by a number of authors (shown in Table 2.9) is the various reasons for going underground. This issue is also discussed by a number of papers that do not focus on bootlegging. So a wide range of reasons is mentioned in the literature. They can be divided into two groups, as are shown in Table 2.8: reasons that are supported by empirical evidence and those which are postulated by the authors.

The first group that are based on empirical evidence include: lack of managerial control; funding systems that do not allow experimental trials; need to increase feasibility of the idea and gather evidence; to pursue ideas that appear between two planning periods; to escape formal orders and break rules; to maintain the independence and secrecy of idea; reluctance to relinquish their idea to someone else; to avoid psychological pressure to come up with a result; to feel comfortable and not

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[42] As was explained, these findings are based on false assumptions and statistical error; they are also gained purely from case studies.

to worry about failure; to protect undeveloped ideas; to work outside the permitted field; disagreement with management; to overcome bureaucratic boundaries; rejection by management; to protect the secrecy of the project to avoid management interference.

The second group of reasons for bootlegging, as are shown in Table 2.8, are not supported by empirical evidence. These reasons include: to pursue ideas outside the company's strategy and core business; to find new products; to solve a problem; a psychological need to engage in bootlegging; lack of mutual trust between employees and their management; tight managerial control; fear of dominant managers; managers supporting underground activities; to test an idea before starting a formal process; the organisation culture supporting underground activities; the organisation showing resistance to change; having different ideas from the rest of organisation; high uncertainty about the procedure and result of project; low cost way to reduce uncertainty; not having room for intrapreneurs in the formal system; to reveal ready-made solutions and become a hero; to define new business; to fund risky projects; and the idea can not be easily assessed by the management.

As is clear from the table, there is a wide range of reasons which include a variety of issues such as managerial methods, organisation culture, personal and psychological reasons, conflicts and disagreement, characteristics of projects, etc. The correlations between these reasons and different variables – e.g. organisational culture and managerial style – have not been explored. The only attempt to distinguish different reasons for bootlegging is done by Peason (1997) which is not based on empirical study. Therefore the literature is not able to explain the diversity in reasons for going underground; which is a clear gap in knowledge. So a research question rising from this gap is why employees choose to bootleg.

Table 2.8: Reasons for bootlegging

Types	Reasons	References
Supported by empirical evidence	Lack of managerial control	Knight (1967)
	Funding system that does not allow experimental trial	Augsdorfer (1996)
	Need to increase feasibility of the idea and gather evidence	Augsdorfer (2008); Debackere *et al.* (1994); Salomo & Mensel (2001)
	To pursue ideas appear between two planning periods	Augsdorfer (2008); Burgelman & Sayles (1986)
	To escape formal orders and break rules	Koch & Leitner (2008)
	To maintain independence and secrecy of ideas	Augsdorfer (2008);
	Reluctance to relinquish their idea to someone else.	Koch & Leitner (2008)
	To avoid psychological pressure to come up with a result	Augsdorfer (2008);
	To feel comfortable and not to worry about failure	Koch & Leitner (2008)
	To protect undeveloped ideas	Koch & Leitner (2008); Cyert & March (1992); Mezias & Glynn (1993)
	To work outside the permitted field	Koch & Leitner (2008)
	Disagreement with management	Abetti (1999b); Pearson (1997)
	To overcome bureaucratic boundaries	Abetti (1999a)
	Rejection by management	Abetti (1997b)
	To protect the secrecy of the project to avoid management interference	Abetti (1997a)
Based on authors' theories or observations	To pursuing ideas outside the company's strategy and core business.	Mezias & Glynn (1993); Granthem & Readman (2005)
	Finding new product	Pearson (1997)
	Solving a problem	Pearson (1997)
	Psychological need to engage in bootlegging	Kanter, (1983); Pearson (1997);
	Lack of mutual trust between employees and their management	Gleicher (1967)
	Tight managerial control	Thompson (1969)
	Fear of dominant managers	Roussel *et al.* (1991)
	Managers supporting underground activities	Shepard (1967); Mintzberg (1990)
	To test an idea before starting a formal process	Talke *et al.* (2006)
	The organisation culture supporting underground activities	Granthem & Readman (2005); Berends *et al.* (2007)
	The organisation showing resistance to change	Jenssen & Jorgensen (2004)
	Having different ideas from the rest of organisation	Jenssen & Jorgensen (2004)
	High uncertainty about the procedure and result of project	Pearson (1990)
	Low cost way to reduce uncertainty	Hamel (2007)
	Not having room for intrapreneurs in the formal system	Pinchot (1985)
	To reveal ready-made solutions and become a hero	Pinchot, (1985); Mezias & Glynn (1993)
	To define new business	Burgelman (1983, 1988)
	To fund risky projects	Burgelman & Sayles (1986); Burgelman (1988); Kanter (2000)
	The idea can not be easily assessed by the management	Cyert & March (1992)

2.8.1.4. Dynamics of bootlegging

In terms of how bootleggers operate clandestinely – how they acquire resources, time and expertise – different papers including bootlegging, underground innovation,

skunk works and those which briefly discuss these issues have made comments which are often contradictory. The majority of papers – Augsdorfer (1996, 2005, 2008), Abetti (1997a, 1997b, 1999a, 1999b), Thompson (1969), Pinchot 1985; Trott (1998), Kanter, 2000; Ma (2002), Richtner and Ahlstrom (2006), Bessant and Tidd, (2007) – agree that slack resources are also vital for any underground activities, although Pearson (1997) theorise that slack resources are not important and Nijhof *et al.* (2002) reports cases of skunk works[43] in which slack resources were not necessary. In addition, Abetti (1997b, 1999a) and Debackere *et al.* (1994) seem to be concern about limitations in acquiring resources, as Abetti even claims that if bootleggers need to, they may steal the required resources for bootlegging

In contrast, Augsdorfer (1996) claims the most crucial barrier for bootlegging is time. He found that bootleggers spend on average 5 to 10 percent of work time on bootlegging however he did not specify whether this average is higher in organisations in which employees are permitted to spend a percentage of their time on their pet projects. Serious concerns regarding the statistical validity of Augsdorfer's average values were raised in this chapter.

Unofficial networks of bootleggers are highlighted as the main path for getting the expertise required for underground projects (Augsdorfer, 1996; Abetti, 1997b, 1999a; Hellstrom and Malmquist, 2000; Koch and Leitner, 2008). Access to different people with a range of expertise is also highlighted by skunk works papers (Rosenau, 1988; Hellstrom and Malmquist, 2000).

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[43] As was explained before, some of the papers discussed in section 2.4 confuse skunk works and bootlegging, Nijhof *et al.* (2002) can be named as one of them.

Since all these data are based on few case studies, it is essential to undertake further investigations about how time and resources are acquired by bootleggers, specially the role of slack resources in bootlegging. No correlation between different elements such as managerial style, organisational culture, etc. with bootlegging dynamics has been explored by previous papers. Those papers primarily report what was going on in each case and therefore there is no analysis available on this issue. Thus, the dynamic of bootlegging still remains as a gap in our knowledge and the question of how bootleggers operate underground remains unanswered.

2.8.1.5. Management attitude and influence on bootlegging

Moreover, managerial attitudes and control are other themes which are partly studied by Augsdorfer (1994, 1996), as shown in Table 2.9. He presents five managerial attitudes toward bootlegging which each influences bootlegging differently. It should be borne in mind that Augsdorfer's study is limited to R&D managers and staff. Abetti (1999a) also presents a relatively similar discussion on managerial attitudes and their influence on bootlegging. So far, senior managers' perceptions of underground innovation have been unattainable. Consequently there is a significant gap in the literature regarding whether senior managers (who are normally strategic decision makers) recognise the existence of bootlegging and whether they see it as beneficiary activities in their organisations. Senior managers are usually the decision makers and strategic planners in organisations; they have responsibility for accepting or rejecting ideas and bottom-up innovations. Thus it is important to know whether they recognise the existence of underground innovations in their firms and have accurate understandings of its influence on the innovation process.

2.8.1.6. The revealing stage of bootlegging

The next issue is concerned with the decision to reveal bootleg projects. According to Augsdorfer (1996, 2005), very few bootleg projects remains underground once the feasibility of the idea has been proved. In contrast, Abetti (1997a, 1997b, 1999a, 1999b) demonstrates two underground innovations in which most of the innovation process was implemented underground and only after completing the final stages were the projects presented to senior managers.

Augsdorfer (1996) and Koch and Leitner (2008) suggest that bootlegging is continued until no further underground progress is possible and the project needs managerial support, while Dickson *et al.* (1991) claim that this type of project[44] would only be revealed when it is benefits for the organization can be proven. Burgelman (1983) makes a quite different point by saying disclosure occurs when bootleggers reach the point that they feel their project is understandable to the management. Meanwhile Pinchot (1988) presents a different view by saying bootlegging is a quite long process and so there is no rush to disclose the bootleg project. Abetti (1997b), on the other hand, highlights that bootleggers wait for a precipitating event to reveal the project.

So, not only is disclosure of bootlegging a barely discussed subject of studies but it also seems there are disagreements in the literature about it. Thus the existing literature is incapable of explaining why and when an underground project will be revealed and what elements influence bootleggers' decisions to reveal bootleg projects – this is a further gap in the literature.

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[44] This is another paper that seems to be confusing skunk works and bootlegging.

2.8.1.7. Bootlegging outcomes

The results of bootlegging is another matter (shown in the Table 2.10) that is studied only by Augsdorfer, However a number of other papers have made contradictory comments in this regard. Augsdorfer finds that in the majority of cases bootlegging results in incremental innovation. On the other hand, Abetti (1997a, 1997b, 1999a, 2004) and Knight (1967) discuss projects that result in radical innovations.

In addition, a considerable number of papers – including those focusing on skunk works or briefly discussing bootlegging – emphasise the capability of underground innovation to yield radical innovations (Abetti, 1997a, 1997b, 1999a, 2004; Burgelman 1988; Burgelman and Sayles, 1986; Roberts, 1991; Freeman and Soete, 2000; Ma 2002; Grantham and Readman (2005), Berend *et al.* (2007) and Amabile and Khaire (2008) Besides, all areas of literature that discuss permitted bootlegging – such as creativity, FFE of innovation and ambidexterity literature – promote such behaviour as a significant source of radical or breakthrough innovation. This contradiction demonstrates our lack of understanding about the type of innovation that has resulted from bootlegging – yet another gap in the management literature.

2.8.1.8. Pros and cons of bootlegging

All the papers focussing on bootlegging, underground innovation and skunk works have positive attitudes toward these activities stating they benefit organisations. Even the papers that only briefly discuss bootlegging are mainly in favour of it. The purpose of bootlegging is to benefit the organisation by technological improvement or the application of new technology (Augsdorfer, 1996, 2008). Bootlegging is the main source of bottom-up innovation (Augsdorfer, 2005) and accelerates the innovation process by going beyond bureaucratic boundaries (Peters, 1983; Rich and Janos,

1994; Abetti, 1997b, 1999a). It creates a significant amount of knowledge and information (Evink and Beam, 1999; Berends et al. 2007) and shares it with the rest of organisation (Grantham and readman, 2005). Bootleggers also assist the learning process in the organisation (Meyer, 2005). So the management literature consists of a wide range of advantages claimed for bootlegging.

Among the papers which briefly discussed bootlegging, only Roussel *et al.* (1991) take a negative perspective and claim that underground activities might go out of control. While there is no other disadvantage or risk for bootlegging named in the literature, there are a few negatives about skunk works that could be extended to bootlegging. For instance, the risk of failure is significant (Peters and Waterman, 1982; Dougherty, 1992; Paxton, 2006) or bootleggers may develop a product that is not producible (Evink and Beam, 1999). Reintegration of products developed in isolation with on-going business is often challenging (Rafii, 1995). Employees may set unrealistic and unreachable targets (Nijhof *et al.* 2002). Information and knowledge from skunk works and bootleggers would not flow to the rest of organisation (Dougherty, 1992). It should be emphasised that papers that thoroughly discuss bootlegging have neglected failed bootleg projects and the disadvantages of bootlegging. Therefore, they are not able to demonstrate any downsides for bootlegging, thus it remains as another gap in our knowledge.

2.8.1.9. Bootlegging influence on official projects

A matter which is hardly discussed is how bootlegging influences the top-down (official) innovation process. Augsdorfer believes that bootlegging is not in conflict with organisations' strategies, but Roberts (1991) and Roussel *et al.* (1991) claim that bootlegging may challenge organisations' strategies. However none of them talk

about the direct influence of bootlegging on top-down innovations. Only Koch and Leitner (2008) mention that part of official projects might be carried out underground through self-organisation. On the other hand, Abetti (1997a, 1997b, 1999a) highlights that resources assigned to official projects might be diverted for use in underground innovation. This is another contradiction in the existing literature which highlights another gap in our knowledge.

2.8.1.10. Conceptual models

Finally, Abetti (1997b) proposes a conceptual model for underground innovation – Figure 2.4 – to explain underground innovations in Toshiba. Another conceptual model is developed by Koch and Leitner (2008) to illustrate the evolution of self-organisation – Figure 2.2. Both models identify several steps through which underground innovations develop, however they look at the process from different perspectives. Abetti model's compares official and underground innovation processes, whereas Koch and Leitner focus on the dynamic of a particular type of self-organisation. It seems both models have a lot in common although Abetti's model is based on two underground innovations in Toshiba and Koch and Leitner's model is based on case studies of five Australian firms in the semi-conductor industry. Considering that bootlegging may vary in terms of being known by management and in the length of underground processing, neither of the conceptual models is able to explain different types of underground innovation. Finally, the absence of an advanced model based on reliable information about bootlegging is clear in the management literature.

2.8.1.11. Bootlegging in a wider range of literature

This chapter also explores three different approaches to the NPD process and attempts to demonstrate how these approaches accommodate bootlegging. As discussed, the linear (stage-gate model) and recursive (chain-linked model) approaches do not acknowledge the existence of such activities, meaning that companies that adopt these approaches will be challenged once they confront bootlegging within their NPD process. On the other hand, the chaotic approach accommodates bootlegging as a part of NPD process particularly in early stages.

This chapter also looks at the early phase of innovation known as the fuzzy front-end. This is generally considered to be the most chaotic stage of the NPD process. A number of researchers discuss the emergence of employees' initiatives and self-organisation – true bootlegging – at the front-end of NPD.

That part of the literature concerned with creativity and idea generation also emphasises the value of giving freedom to employees working on early stage innovation in the belief that this increases the number of ideas generated, fosters radical innovation and keeps employees motivated. The literature highlights permitted-bootlegging as a method of maximizing creativity and innovation. In agreement with them, several papers from intrapreneurship, strategy and behavioural theory also stress the benefits of bootlegging for organisations.

The concept of ambidexterity as a potential solution to the dichotomy between exploration and exploitation activities is briefly reviewed. This concept is discussed across a wide range of management studies, including those focussing on innovation. Within this context, ambidexterity is interpreted as a method of pursuing both radical and incremental innovation concurrently. Recently, two types of ambidexterity have

been identified in organisations. Structural ambidexterity, where a unit is set up separate from the rest of the organisation solely to pursue exploration (specifically radical innovation), is effectively the encouragement of skunk works. Contextual ambidexterity, which allows individuals to divide their time as they see fit between exploration (radical innovation) and exploitation (incremental innovation), is comparable with permitted bootlegging. In other words, contextual and structural ambidexterity can be regarded as promoting the principles of skunk works and permitted-bootlegging across the whole organisation, not just within the R&D function.

Table 2.9: Issues covered by papers which focus on bootlegging, underground innovation and skunk works

Primary focus	Authors	Being based on empirical evidence	Extent of bootlegging	Bootleggers' personality	Reason for bootlegging	Dynamics of bootlegging	Managerial influence	Disclosing bootlegging	Bootlegging outcomes	Pros and cons of bootlegging	Influence on official project	Conceptual models
Bootlegging	Knight (1967)					✓						
	Augsdorfer (1994)	✓			✓	✓	✓			✓		✓
	Augsdorfer (1996)	✓	✓		✓	✓	✓	✓		✓	✓	✓
	Pearson (1997)		✓		✓	✓		✓			✓	
	Augsdorfer (2005)	✓	✓		✓	✓		✓		✓	✓	
	Augsdorfer (2008)	✓	✓		✓	✓		✓		✓	✓	✓
	Koch & Leitner (2008)	✓	✓		✓	✓				✓		✓
Underground Innovation	Abetti (2004)	✓		✓	✓	✓				✓		
	Abetti (1999b)	✓			✓	✓		✓			✓	
	Abetti (1999a)	✓			✓	✓	✓	✓	✓		✓	
	Abetti (1997b)	✓			✓	✓		✓	✓		✓	
	Abetti (1997a)	✓			✓	✓			✓			
	Aram (1973)	✓			✓	✓				✓		
	Peters and Waterman (1982)	✓		✓		✓						
	Peters (1983)								✓	✓		
	Rosenau (1988)	✓			✓	✓						
Skunk works	Dickson et al. (1991)	✓			✓	✓				✓		
	Dougherty (1992)	✓			✓							
	Rafii (1995)				✓							
	Evink and Beam (1999)	✓		✓	✓	✓			✓			
	Hellstrom & Malmquist (2000)	✓			✓					✓		
	Ma (2002)											
	Nijhof et al (2002)	✓			✓	✓			✓	✓		
	Diamond (2005)	✓			✓	✓			✓	✓		
	Paxton (2006)	✓			✓	✓						
	Fosfuri and Ronde (2007)									✓		
	Andersson & Berggren (2007)			✓	✓	✓	✓					

Issues discussed in bootlegging, underground innovation and skunk works literature

2.8.2. Choice of research questions

So far, eight research gaps in the literature have been identified comprising gaps in regard to:

- Whether the extent and the nature of bootlegging vary in different organisations, industries and countries.

- Why employees choose to bootleg.

- How bootleggers operate underground, i.e. how they acquire time, resources and expertise required for bootlegging.

- To what extent different levels of management perceive the existence of bootlegging in their organisations, what their attitudes toward bootlegging are, and how they can control or influence bootlegging.

- Why, when and how bootleggers reveal their bootleg projects.

- What the outcomes of bootlegging are, i.e. what type innovation normally results from bootlegging and whether it yields other outcomes.

- What the pros and cons of bootlegging are in comparison to official process.

- How bootlegging influences official projects, e.g. whether it facilities official projects or interrupts them by redirecting time and resources assigned to them.

In almost all aspects of bootlegging, either there is no empirical research that presents convincing arguments or there are contradictions between different viewpoints and/or research findings.

This research has chosen to address four main knowledge gaps which are also the most controversial issues in the literature. These knowledge gaps are the reasons for bootlegging, the dynamics of bootlegging, the disclosure stage of bootlegging and the

outcomes of bootlegging. Addressing these four gaps not only sheds lights on the four most controversial issues about bootlegging but also other undiscovered other aspects of bootlegging.

First, there is a number of different reasons for bootlegging – often contradictory – raised in the literature. Thorough investigation of this issue by considering a variety of environmental, personal and project characteristics helps this research to understand why there are various reasons in the literature, what elements influence the decision to initiate bootlegging, and what type of projects are pursued underground (whether formal projects pursued underground or projects that are completely new). So it also helps to comprehend whether and how bootlegging influences official projects.

Studying the dynamics of bootlegging is not limited to understanding how bootleggers operate clandestinely. It is crucial to understand whether bootleggers use the organisation's time and resources and if they use organisational time and resources how much of them are consumed for bootlegging and hidden from management eyes. Knowing how bootleggers operate also helps to understand how they can be influenced, even if it is not possible to manage them.

The third critical knowledge gap that this research tries to fill is the stage in which bootlegging is revealed. It helps us to understand when bootleggers reveal their projects, how far bootleggers go underground, what makes them reveal their projects and whether what will be found as the reason and purpose of bootlegging is in fact the reality.

The final gap that is to be addressed by this research is the outcomes of bootlegging. As was said, there is disagreement about the types of innovation resulting from bootlegging. This is especially important since some of the management literature

recommends actions similar to bootlegging (e.g. ambidexterity and permitted bootlegging) as a method of achieving radical innovation. In addition, there is no information available on bootleg projects that fail to result in innovation. Thus, it is not known whether there are other types of outcomes that projects may or may not have. It must be highlighted that the only way to judge whether bootlegging truly is a valuable activity is to understand how bootleggers operate – what they use in terms of resources and time – and what their true outcomes are.

As has been argued, addressing these four knowledge gaps goes beyond enhancing our knowledge about these four issues but also sheds light on other crucial aspects of bootlegging. Besides these four issues seem to complement to each other. Therefore, the following four research question will be investigated by this research:

RQ 1. Why do employees choose to bootleg?

RQ 2. How do bootleggers find the time and acquire the resources and expertise to operate clandestinely?

RQ 3. What are the factors that cause bootleggers to reveal their clandestine projects?

RQ 4. What are the tangible and intangible outcomes of bootlegging?

CHAPTER 3:

RESEARCH METHODOLOGY AND DESIGN

3.1. Introduction

The purpose of this chapter is to explain the research methodology and design of this research project. As has been discussed, there are not many studies on bootlegging due to the difficulties involved in studying this subject. Besides, sensitive topics, such as clandestine behaviours, are rarely studied in the management literature even though there are several other areas of research in social sciences in which similar topic can be found.

3.1.1. Layout of this chapter

To discuss the design and methodology of this chapter, several aspects of this research need to be considered. The next section, 3.2, of this chapter explores different philosophical perspectives in social sciences and finally presents realism as the philosophical perspective of this research. The third section, 3.3, gives reasons for choosing a retroductive strategy as the appropriate research strategy based on the realistic philosophical perspective. It also covers different stages of retroductive strategy. The fourth section, 3.4, covers the research design. It starts by presenting research questions. Then it discusses the preliminary research design and methodology chosen for this research followed by discussing the first pilot study, its limitations and the need to revise to the research design and methodology. This section continues by considering other research methodology and includes thorough discussion of the specific interview designed for this research considering the complications of studying a sensitive issue. The section concludes with the final research methodology and chosen data collection method. The fifth section, 3.5, highlights the necessity of undertaking a pilot study and its outcomes. The following section, 3.6, covers a discussion presented

to justify network sampling – i.e. snowball sampling – as the only feasible option for this project. It also includes the special consideration required with sampling for studying bootlegging as a sensitive topic with a rare population. Then the seventh section, 3.7, presents every step of the data analysis process followed by a short section, 3.8, highlighting the units of analysis. The ninth section, 3.9, first discusses the quality of qualitative research, specifically projects built upon the realist approach and then covers the parameters evaluated for the quality of realist research for this specific project. Finally, the chapter concludes, in section 3.10, by presenting a summary of the discussions in this chapter.

3.2. Philosophical Perspective

Prior to making any decision about different aspects of the research project, it is essential to discuss the philosophical perspective of the researcher, as it is the foundation of the research. Based on the chosen philosophical perspective, it is possible to choose the research strategy and thence the research methodology. The appropriateness of research methodology also makes sense once the philosophical perspective of the research is decided. This section first reviews different features of philosophical perspectives and various philosophical approaches. Then, it elucidates the underpinning philosophical approach of this research.

3.2.1. Different philosophical perspectives

Philosophical perspectives propose unique approaches to study based on two elements, ontology and epistemology[45]. Social researchers design their research based on their ontological and epistemological constructs, their philosophical perspective and the appropriateness of relevant methodology for studying their subject. Philosophical perspectives can be considered as a spectrum which has two extremes; one extreme is positivism[46] – the scientific approach – and the other pole is interpretivism[47] and

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[45] Ontology refers to the nature of social reality while epistemology is concerned with underlying assumptions of the method of studying reality in order to understand it (Blaikie, 2007). These two elements have a significant influence on the research design and methodology chosen by the researcher.

[46] A positivist approach is based on the belief that objective truth exists in the world regardless of the researcher (Orlikowski and Baroudi, 1991). Therefore, positivist researchers study correlations of variables that do not change from one place to another or over time (Perry et a. 1999). Positivist social

constructionism – the subjective approach. There are other perspectives, which are neither so objective as positivism nor so subjective as constructivism, that are often applied by social research to study social phenomena. One of these perspectives is 'realism' which is applied for the purpose of this research.

3.2.2. Realism

The philosophical perspective adopted in this research is realist. This section outlines two elements of this philosophical perspective – ontology, epistemology. Further this chapter discusses the third aspect of this philosophical perspective – methodology – and considers its appropriateness to this research.

Realist ontology is based on the assumption that the real world exists independently of the researcher, though we may not be able to perfectly understand it (Guba and Lincoln, 2005). Social reality, from this perspective, is built upon structures that may not be visible. In other words, social reality, from the realist perspective, is created by actors who make choices in an inconsistent way, not in an automatic manner as assumed by

researchers may use scientific methods to test a theory and predict a phenomenon (Orlikowski and Baroudi, 1991).

[47] Constructivist and interpretive perspectives are positioned at the other end of the spectrum with an strong subjective approach to reality. From these perspectives, the objective reality that can be studied by researchers does not exist (Mir and Watson, 2001). In contrast, from a constructive perspective, reality can only be created by researchers. Thus, reality observed by one researcher cannot be recreated and studied by another researcher (Walsham, 1993). On the other hand, interpretivist researchers, who agree with constructivists on the subjectivity of reality, try to comprehend reality by studying its meanings and interpretations (Orlikowski and Baroudi, 1991).

positivists (Bhaskar, 1989). In realist philosophy, reality is neither as objective as it is for positivists nor as subjective as it is for critical theorists and constructivists (Healy and Perry, 2000).

Realist researchers do not believe that social phenomena can be replicated and studied in laboratory conditions, as they occur in an "open system" and social actors behave unpredictably (Healy and Perry, 2000). The social phenomena that we observe are founded upon "underlying structures and mechanisms", which realist researchers seek to uncover (Blaikie, 2007). The epistemology of realism is about forming models which can explain these "underlying structures and mechanisms" (Blaikie, 2007). In contrast to positivists, who seek knowledge that is capable of explanation and prediction, this study, as an example of realist research, mainly attempts to illuminate the underlying structures and mechanisms connecting different social phenomena in order to explain these phenomena.

3.3. Research Strategy

Since this research is based on the realist approach, inductive and deductive research strategies seem to be inappropriate. This is mainly because the realist view is that *induction* (making generalizations from data) and *deduction* (testing hypotheses) are incapable of explaining the invisible underpinnings of social phenomena (Blaikie, 2007). As recommended by realists, a retroductive strategy was chosen for this research, because it enables the generation of hypothetical models to explain the underlying structures and mechanisms of bootlegging. Besides, there is a limited number of previous studies on bootlegging so this strategy is the most appropriate strategy considering the nature of the research questions and the purpose of this research.

Retroductive strategy consists of three stages (Blaikie, 2007). At initial stage, the researcher investigated correlations and links between different phenomena in order to find underlying structures and mechanisms and tired to explain why these links and correlations exist (Blaikie, 2007). In the second stage, as recommended by Blaikie (2007), hypothetical models were constructed using a combination of fact and speculation and attempts were made to present justifications for patterns that are seen in the empirical data[48]. In the final stage, the phenomena under examination, bootlegging, were then carefully investigated and the models were empirically tested. Only when the

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[48] Obviously as is highlighted in the realist literature, the researcher's knowledge and experience influence his analysis and interpretations in this stage (Costello, 2000).

test results seemed to be successful, was the researcher able to conclude that the

assumed structures and mechanisms exist[49].

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[49] As will be shown in the discussion chapters, there were some exceptions observed in the data. As a

realist research, it was important to be able to show that discovered underlying structures and

mechanisms are able to explain these cases. To describe determined structures and mechanisms in this

research, this process has to be reiterated as upon Blaikie (2007) recommendation. In other words, this

research exemplified the process that is well described by Blaikie (2007). 'This process is analogous to

pealing the layers off the proverbial onion. As one set of structures and mechanisms is postulated, tested

and revealed, others at a lower level go through the same process' (Blaikie, 2007).

3.4. Research Design

The purpose of research design is to put research questions in to research projects (Robson, 2002), so the appropriate data collection, data processing and data analysis method are applied to answer the research questions. Obviously the research design must be in line with chosen philosophical perspective and research strategy. Thus it is necessary to review research questions that this research is trying to answer

3.4.1. Research questions

The research questions are presented here to emphasise the nature of these questions. These four research questions focus on different steps of bootlegging – from initiation to completion – and their outcomes. These research questions are:

RQ 1. Why do employees choose to bootleg?

RQ 2. How do bootleggers find the time and acquire the resources and expertise to operate clandestinely?

RQ 3. What are the factors that cause bootleggers to reveal their clandestine projects?

RQ 4. What are the tangible and intangible outcomes of bootlegging?

3.4.2. Preliminary research design and the need to redesign it

Among the different methods of data collections used for realist research projects – survey, interview, ethnography and case study – multiple case studies was the method initially chosen for this research. The detail of why multiple case studies was assumed to be the most appropriate method for this research; how the case study protocol were

developed; how the first pilot study were executed and data were analysed are explained in Appendix I.

Unfortunately, the case study faced several unexpected challenges during the data collection and analysis process that showed the need to change the research method. On the other hand, this method had some strengths that should not be neglected. Pros and cons of this method are also explained in Appendix I.

In spite of our concerns that R&D staff would be reluctant to talk about their clandestine activities, those interviewed were happy to proactively contribute to this research and discuss bootlegging openly. However, while they were comfortable talking about previous, now exposed, bootleg projects, they were more hesitant about discussing on-going bootleg projects. The main limitation of this method was that R&D staff only discussed their successful experiences and did not talk about their failures. This was because they were approached by the researcher through their organisation and specifically through their management.

On the other hand, interviewing management did not reveal any significant information about bootlegging. Senior managers seem to have very limited information about what is going on in their R&D lab. They also believed that all their R&D achievements is result of their decision, guidance and directions they give R&D departments. At the same time, R&D managers were not confortable discussing an issue (bootlegging) that implies there are not in control of their units. On the other hand, they did not allow the researcher to go through their documentations to check other source of data. Only in one case, the researcher was given access to the feasibility study and proposal prepared by an employee at the end of bootleg project. Even those documents were not helpful as they did not include any information about bootleg process and they only reflect aspects of bootleg project that bootleggers tried to disclose to management.

All these limitations highlight the necessity of revising the research design for this research project. Thus the next step was to find an appropriate research methodology to pursue this research. In addition, the PhD review panel after the first PhD review recommended the researcher to consider other research methodologies for this research.

3.4.3. Revising the research design

The study of bootlegging is different from mainstream research in the management field, mainly because of the clandestine nature of bootlegging. This difference impelled the researcher to investigate research methods used in other fields. Very soon, it became clear that studying bootlegging is very much similar to sensitive research topics, and so it calls for special consideration. In the social sciences, sensitive areas of research are defined as those which may potentially have an adverse effect on the participants or a specific group of individuals (Stanley et al. 1987), or which may cause alarm to those in the sample group (Lee and Renzetti, 1990).

Although this type of research is very rare within management literature, it is widespread in the fields of economics, criminology, sociology, anthropology, psychology, health and clinical studies[50]. Considering the methods used within these areas of research provides an alternatives to the approaches conventionally applied in management research. Surveys, interviews and, to a lesser extent, ethnography are the

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[50] Sensitive areas of research have included the shadow economy (Schneider and Enste, 2000; Schneider, 2005), the underground economy (Lemieux et al. 1994), tax evasion (Slemrod, 2007; McGee and An, 2006), drug abuse, drug trafficking, prostitution (Jupp, 1989; McKeganey and Bernard, 1996; Jupp et al. 2000; Valera et al. 2001; Farley, 2004), gay and lesbian issues (Murphy, 2000), sex related issues (Kemmer, 1977; Brewer and Wright, 1979; Mason, 1983), HIV and nursing (Faugier and Sargeant, 1997; Platzer and James, 1997; Holloway and Wheeler, 2002; Polit and Beck, 2008).

main methods applied for studying sensitive topics[51]. This section reviews the pros and cons of these various approaches, concluding that the most appropriate approach for this research is the interview.

3.4.3.1. Ethnography

Ethnography, as a methodology that helps get close to the population that is not easy to reach (Hines 1993), is specially used to collect information that could not be collected by using methods such as survey, interview or case studies. Although this approach gives a deep understanding of the event, it is not the most appropriate strategy for studying bootlegging.

First, in regard to sensitive research topics, where an ethnographic approach is adopted, the research is usually conducted covertly or semi-covertly. Covert and semi-covert strategies, because of their ethical concerns and implications (Bulmer, 1982; Stanley et al. 1987; Itti and Koch, 2000), cannot be used for PhD projects.

Second, applying ethnography, it is necessary to go through formal and informal documents and archives to collect information from different sources. As was discovered in the first pilot study, it would be difficult to access the range of documents and information required for this approach (Johnson, 1978; Warren, 1984) as individuals in the organisation may hesitate to share them.

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[51] Survey, for instance, was used to study the shadow or underground economy (Schneider, 2005; Lemieux et al. 1994); interviews were used for studying sex related and gay and lesbian studies (Murphy, 2000; Mason, 1983); and ethnography is more common to study drug related issues and prostitution (Valera et al. 2001; Farley, 2004).

Third, as is required by ethnography, the researcher could only successfully collect required data when he is trusted and invited by the participants to work with them on their bootleg projects (Marcus, 1998). It is logical to assume that bootleggers tend to invite people to cooperate with them according to the needs of the project. As the researcher has no technical expertise in the bootleggers' field, the chance of being invited in is almost nil.

Fourth, another method of data collection that is often used in ethnography is observation (Marcus, 1998). Observation – of any kind – as a method of data collection is not possible, as to understand R&D projects requires expertise in the field and technology. Nor is it a straightforward task to distinguish official projects from bootleg projects.

Fifth, carrying out an ethnographic study requires spending a significant time period in the organisation (Marcus, 1998), which can only be done with the permission of the management. Not only does this make the data collection process too long for a PhD project but also this direct link with the management would make bootleggers less likely to trust the interviewer. Bootleggers are more likely to be forthcoming if the researcher approaches them as an outsider who has no connection to the organisation or its management.

3.4.3.2. Survey

Survey methodology is, as a systematic approach to collecting data by questioning individuals, is also used to study sensitive issues (Lee, 1993). Unlike ethnography, which is limited in terms of its generalizability and validity (Marcus, 1998), surveys enable the researcher to consider a much larger sample (Hill, 1995). Both online and offline surveys were considered for this research. A specific benefit of a survey,

specially an online survey, for this research is that questionnaires can be filled up anonymously, as in the studies of software hackers (Flowers, 2008; and Schulz and Wagner, 2008).

Although there are some benefits in using surveys – as mentioned above –, a survey alone does not seem to be the most appropriate tools for this research, mainly because it is not capable of gathering in-depth information about the topic (Lee, 1993). Second, attracting a large enough sample to undertake a survey on a sensitive issue is also a difficult task. Bootleggers may be considered a rare sample and even finding appropriate people to be questioned is not a straightforward task. Third, it is important to identify bootleggers beforehand to make sure that survey is questioning a relevant population. Fourth, because it is necessary to discuss technical issues and differentiate various projects – specially distinguishing between formal and bootleg projects, survey is limited in terms of asking clarifying questions.

3.4.3.3. Interviews

The interviews – especially the in-depth interview – is generally considered the most appropriate method for studying sensitive issues (Brannen, 1988; McCracken, 1988; Lee, 1993; McPhee and Terry, 2007). Not only does it enable the researcher to consider a relatively large sample; it also facilitates the collection of comprehensive data about the topic (McPhee and Terry, 2007).

In particular the face-to-face interview enables the researcher to capture interviewees' reactions to questions, such as facial expressions. Capturing truthful statements and arguments seems to be easier in interview (Lee, 1993). The researcher would be able to administer the interview interactively. When further explanation or an example is required, the interviewer can ask for clarification. In addition, gaining interviewees trust

is easier for interviewer. For these reasons and several others that will be discussed in the following section this method was adopted for this study.

3.4.4. Research process

Figure 3.1 demonstrates the research process as is explained so far in this chapter. Initially after completing the literature review and identifying the knowledge gap, this research was designed to use multiple case studies. As is shown in the figure, after a pilot study was undertaken and the data was analysed, it became clear that because of the characteristics of this research and limitation of case studies it is necessary to reconsider the research design. This is done by going through the literature on methodology in a variety of social sciences such as economy, sociology, anthropology, criminology, etc.

Figure 3.1: The research process
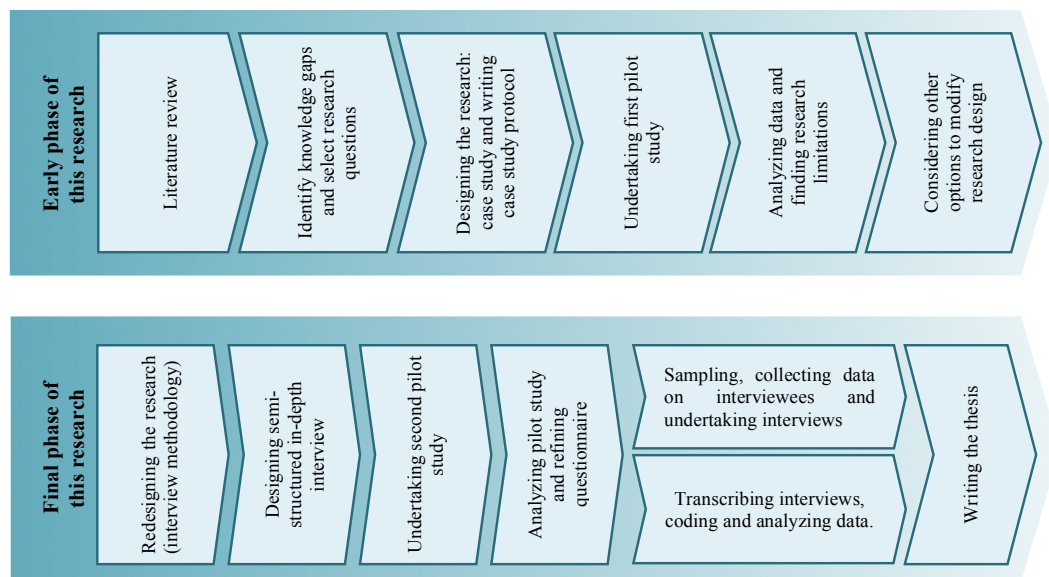
As is shown in this figure, after considering different methodologies used to study sensitive topics, in-depth interview was chosen for this research. Semi-structured

interviews were then developed and put to test through a pilot study. Following that the data collected from the pilot study was tested and the questionnaire designed as the interview was refined. Then a sample was to taken to pursue this research, meanwhile as the interviews were undertaken they were transcribed and data was analysed. The rest of this chapter focuses on the final phase of this research and explains it in detail. The process of undertaking research is also shown the following sections.

3.4.5. Method of data collection

The primary data collection method for this research was the interview. A semi-structured questionnaire was initially designed to maintain consistency across the sample while at the same time enabling the capture of interviewees' personal experiences and perspectives and giving them the opportunity to tell their individual stories (Hill, 1995). Given the sensitivity of the topic, special care was taken with the design of the interview as is emphasised in the literature that discusses studying sensitive issues of research, such as Lee and Renzetti (1990), Brannen (1988), Lee (1993), Faugier and Sargeant, (1997). For instance, in terms of the vocabulary used in the interviews, it was very important to be careful not to cause any distress to interviewees[52].

The main challenge was gaining the interviewees` trust; a number of steps were taken to achieve this. First, the use of face-to-face interviews makes it easier to gain the interviewees' trust and to ask sensitive questions. It also allows room for further

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[52] For example, instead of using words like bootlegging, underground and clandestine, words such as unofficial, informal and independent were adopted. During the design stage several academics, including experts in studying sensitive topics from other fields, were consulted.

explanation and asking clarifying questions where required. It enables the interviewer to observe the interviewees` reactions to questions, their facial expressions and body language. Second, interviewees were reassured that the research would not impact on them in any way. This was achieved partly by persuading them that the researcher has no interest in the details of any current projects they were working on and have no links with their organisation.

The interviews were therefore carried out at weekends or after work in a comfortable place outside the organisation such as a coffee shop, a hotel lobby, restaurant etc. Care was taken to approach them via their bootlegging network and not through the organisation or its management. This has significantly helped diminish the hierarchical power the interviewer conventionally has over interviewees and improved trust (Brannen, 1988).

How the topic was presented to interviewees was also a potential challenge to the trust building process. As Lee (1993) recommended, the interviewees were given only a general idea of the topic beforehand. When they were invited for an interview, they were sent two links to the university website and asked to review them before the interview[53]. Therefore, by the time they were attending the interview they would have some information about the researcher and his background; so they could more easily trust him.

In addition, it was necessary to gather background information about the interviewees and their organisations before conducting the interviews. Company information was

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[53] The first link was to the web page on the Cranfield university website that presents this research project as a project on informal methods of innovation. The second link was to the researcher's personal profile on the university website.

collected by referring to company websites, annual reports and online profiles, while personal websites, LinkedIn profiles and company websites were used to gather information about interviewees and their organisations. Information such as the size of the organisation, their main business, range of their product, their R&D size, etc. were all gathered prior to go to the interview[54].

Each interview began with specifics being introduced and the topic was gradually developed during the interview, as recommended by Brannen (1988). At the beginning of the interview, they again were reminded that the researcher had no interest to serve in their organisation nor to make interruption for them. The interviewee was assured that the discussion would be confidential and that their anonymity would be preserved. They were also asked to discuss any concerns they may have. Then their permission was sought to audio-record the interview. They were informed that they were free to refuse to answer any questions and able to stop the interview at any time. They were also advised that they could ask for the recording to be stopped if they wanted to share information that they preferred not to be recorded. In order to encourage them to participate, interviewees were advised that they would receive a brief document outlining the research findings and their implications for the organisation and individuals once the research has been completed[55].

After an introduction lasting approximately five to ten minutes, as discussed above, the first phase of interviews began with general questions about the interviewee and their organisation. Interviews started with questions about the size and structure of the

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[54] If some of the required were not available online, the interviewee would be asked to provide this information.

[55] This document will be sent to the participants promptly after the viva,

interviewee's organisation, R&D or product development department and group, followed by questions about the organisation's hierarchy. As it was also important to understand the role and the position of interviewees, an attempt was made to identify the decision makers for R&D projects, how decisions were made about R&D projects, and the role of the interviewee's direct manager. The interviewee's relationship with management, and specifically with his/her manager, was queried. R&D budget allocations and the interviewee's access to any sort of budget were carefully investigated. Although these questions did not take more than five minutes, they were important because they gave the chance for the interviewer and interviewees to spend some time having a conversation before starting on the sensitive questions.

At this stage, once it was felt that the interviewee's trust had been gained, the second phase of the interview – the main phase – began, this was set to discuss more sensitive issues. Initial sensitive questions tried to find out what the bootleggers do when come up with a new idea and when they start a bootleg project in general. Then they were asked how many bootleg projects they had pursued during the last two years and to what extent they were clandestine. At this stage, it became fully clear whether the interviewees were really bootleggers. Then they were asked to choose a bootleg project which had been completed in order to discuss it in detail. Once they chose a project, we discussed it from its initiation to the disclosure process. Then the outcomes of the chosen project were discussed. This part of interview was completed by questions about personal benefits of bootleg projects for the interviewees. After letting the interviewee discuss any things that s/he wanted to mention that were not covered by the questions, the second phase of interview ended and the audio record were stopped. However the interview was not completed then.

The third phase of interview was a short questionnaire that was developed in the form of a table that was filled in by the interviewer with the help of the interviewee. This questionnaire includes questions about the outcomes of bootleg projects that the interviewee had previously mentioned s/he had pursued during the last two years. At this stage of interview, the audio recorder was off. The idea behind this questionnaire was to engage the interviewee proactively in data collection and give another chance to the interviewee to discuss any issues that s/he may prefer not to be recorded. It was assumed that some of these projects might have failed and not recording the discussion would help interviewees to talk more openly about their failed bootleg projects. In practise, the discussions at the end of interviews that were not recorded were limited to the bootleg project pursued during in last two years or failed bootleg projects. A wide range of issues often discussed at this stage including discussion of the relationship of the interviewee with his/her manager or criticism of organisation management, strategy, how important bootleg projects are for interviewees and their organisations, etc. Since this part of discussion was not audio-recorded, the interviewer tried to take notes of issues raised by the interviewee during the conversation.

Given the sensitivity of the topic, it was critically important to undertake a pilot study. The pilot study indicates whether it is possible to gain interviewees' trust and whether the chosen strategy is capable of gaining the required data. It was important to establish whether it is possible to find out about failed bootleg projects which did not result in any innovation.

3.5. Pilot Study

The pilot study was also used to ensure that the interview questionnaire was worded appropriately, that the questions were clear – with no vagueness or ambiguity – and the interviewee could understand the questions. It was important to identify any bias in the interviews and revise the questionnaire accordingly.

Four interviews were conducted for the pilot study to test the interview design, and the data gathered was analysed immediately. It quickly became clear that a few questions needed to be reworded and a few others needed to be reordered in the questionnaire. There were some aspects of bootleg projects that were raised in the pilot study interviews that the researcher was unaware of. For instance, an element of support was discovered as one of the needs of bootleg projects especially when the bootleggers needed to reveal their projects. Another issue was the significance of the direct manager's roles and their relationship with the interviewees. In light of this, the interview questions were modified slightly after the pilot study. The final version of the interview questions can be found in Appendix II.

In general, the pilot study confirmed that this strategy is capable of gaining interviewees' trust and collecting the required data. More importantly, it indicated that interviewees were willing to honestly discuss their failures if they were specifically asked to do so. Finally, this was a good opportunity for the interviewers to practise their interview strategy, especially in terms of presenting the topic, gaining interviewees` trust and finding the right moment to ask sensitive questions.

3.6. Sampling

Probability sampling, in particular random sampling, was not an option for this research because this research target is a '*rare and deviant population*' (Lee, 1993) and the research focuses on the sensitive issue of bootlegging (Lee, 1993; Faugier and Sargeant, 1997). Options were therefore limited to those non-probability methods, as discussed by Lee (1993), that are commonly used for studying sensitive issues i.e. *list sampling, multi-purposing, screening, networking, outcropping, advertising and servicing* (Lee, 1993). Given that bootleggers are considered to be a '*rare and deviant population*' (Lee, 1993) and there is no list of this population available, networking (snowballing) was the only feasible option for this study (Biernacki and Waldorf, 1981a; Faugier and Sargeant, 1997).

Snowball[56] sampling was undertaken in two stages: initial contacts were sought within bootlegging communities, and then the sample was developed by asking participants for referrals to other bootleggers.

The first challenge is therefore to establish a connection with bootlegger communities. The researcher used his personal network to get in touch with people who have a history of bootlegging in high technology industries. Besides, it was expected to gain introductions to more bootleggers through the Cranfield School of Management and other universities' networks. Unfortunately, through universities it was not possible to gain any contacts. Therefore, to get initial contacts. the researcher attended seven

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[56] In network sampling or specifically snowball sampling, the researcher used his network and those who participated to grow the sample.

engineering and professional conferences and events. Figure 3.2 shows different

sources – such as the personal network and conferences that the interviewer used to get

hold of potential candidates for interviewees. These conferences include:

- The Annual Symposium of the Ultrasonic Industry Association

- Healthcare Forum at Babson College

- International Telecom Week

- Sensor Mesh and Ad Hoc Communications and Networks

- SEMICON West

- National Fibber Optic Engineers Conferences

- Optic Fibber Communication Conference

Figure 3.2: Different sources of contacts used for snowball sampling
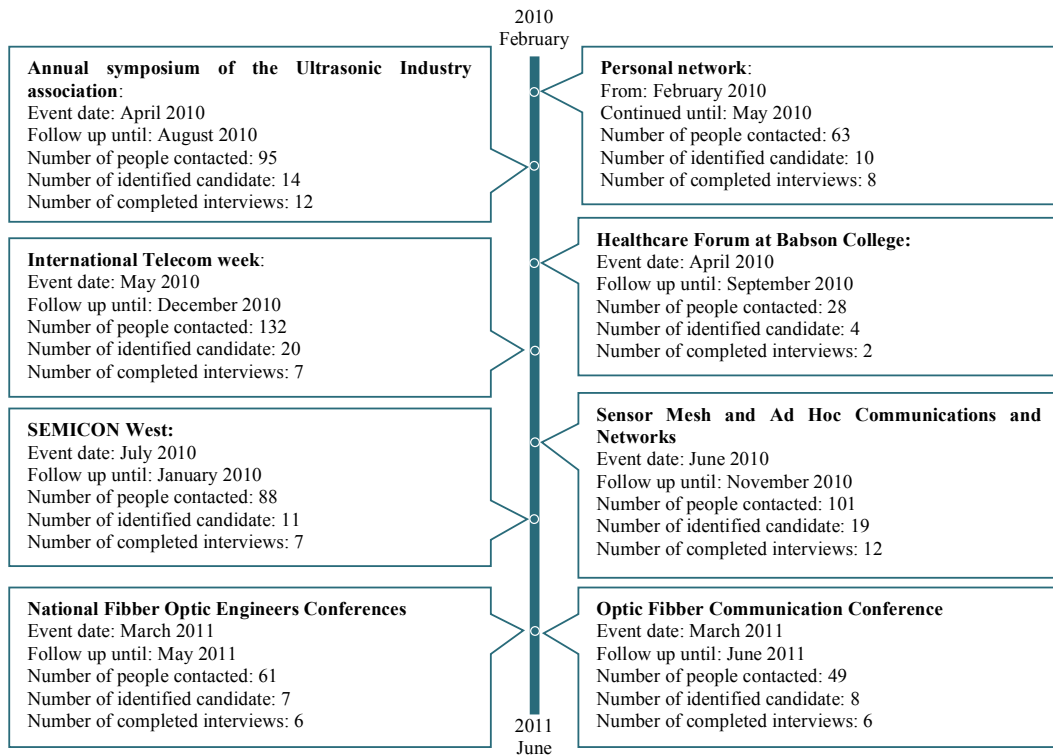
At these events, the researcher talked to people who came from different high technology based corporations. Since people who attend these events normally use name tags that include their affiliation, it was easy to identify people who seemed to be interesting to talk to. At this stage, the researcher would start a conversation with an individual who he thought might come from the R&D departments of targeted organisations. First, he would introduce himself, let them know he was working on PhD thesis and wanted to talk to people who came from R&D departments of high technology corporations. Then he would ask what their position was and what department they were working in. If they were not from the R&D department, the researcher would ask them to put him in touch with their colleagues from their R&D department who may or may not be attending that event.

If they were from research, technology development, R&D, or product development departments, the researcher would continue the conversation by asking them about their experience of coming up with a new idea and what they did when they had a new idea. Then he would ask if they pursued any informal projects in any form of shape. By experience the researcher learned that when he was talking to a bootlegger they would become excited once they talked about innovative ideas and they often made comments such as "*the R&D department is run by MBA type of manager and they do not understand technical complication of projects*" or "*to create something new, you have to do more than what you are told to*". This type of comment is a good indication that this person would bootleg. At this stage, the researcher and the potential participant would exchange contact details and the researcher would invite them to attend an informal interview.

The researcher assures them that the purpose of this informal talk that they would have at their convenience, was to explore how they work informally and it would benefit his

PhD thesis. The researcher also assured them that he had no interest to serve in their organisation. The interviewee was assured that the discussion would be confidential and that their anonymity would be preserved. They were also encouraged to participate by promising to send them a brief document outlining the research findings and their implications for organisations and individuals once the research has been completed.

As was mentioned, once those initial contacts within the bootlegging network in difference organisations was gained, they were asked at the end of their interviews to refer the researcher to other bootleggers that they knew (in their organisation or others). Since bootleggers develop informal networks to meet the needs of their bootleg projects (time, resources and expertise), it was expected that the sample could be expanded very quickly. Even though most of interviewees admitted to collaborating with their colleagues on bootleg projects, the majority hesitated to put the interviewer in touch with bootleggers in their company. Where they did refer him to other bootleggers, they were mainly in other organisations. Thus, as the likelihood of growing the sample by snowballing seemed limited, the need arose to make more initial contacts. Although raising the number of initial contacts has the advantage of decreasing bias in collected data, it caused the data collection process to take more time than expected (18 months instead of 6 months).

During the process of data collection and finding qualified candidates for interview, the researcher always tried to reach bootleggers through their networks rather than through their management and organisation. Meeting bootleggers outside their organisation and being introduced to the bootlegging network by a member of the network facilitate the building of trust between interviewee and interviewer (Atkinson and Flint, 2001).

As is shown in the Figure 3.3, by the end of data collection process, over 600 engineers and scientists who work in research, technology development, R&D or product

development departments of different high technology corporations were interviewed. Among them, 93 bootleggers have been identified and contacted to arrange interviews, with only 60 attending an interview. Those who refused to participate mainly had three excuses: they were either prohibited by their company from discussing any aspect of their work with anyone outside the company, wary of being caught in a possible scam to gather information on R&D projects, or too busy to do an interview.

Figure 3.3: The process of getting sufficient interviews
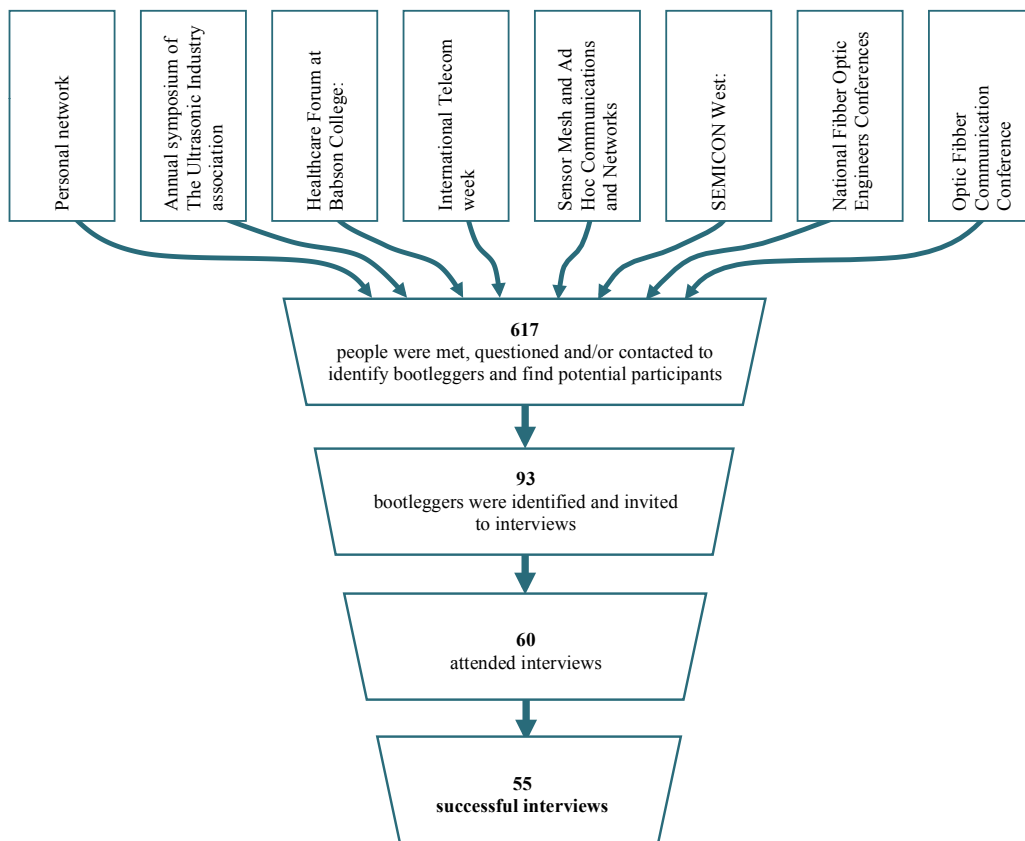
Of the 60 interviews, only 55 were useful. The other five interviewees either worked too independently from the company (one interviewee) or completely denied any sort of

unofficial activities (four interviewees), possibly because the interviewer failed to gain their trust. By the end of this process 520 emails had been sent out and 388 phone calls had been made to introduce the research project and researcher to potential participants, get further contacts, inform potential participants, arrange or rearrange interviews, remind people of interviews, thank participants, etc. it means, on average, for each successful interview over nine emails had been sent out and seven phone calls had been made.

On average each interview – excluding introduction and the final discussion that was not recorded – took 72 minutes. The interviews were very focused. As previously mentioned, prior to interviews the required background information about the interviewees and their organisation – such as the size of their organisation and the range of their products – had been collected, so through the course of the interview it would be possible to focus on bootlegging.

3.7. Data Analysis

Four separate sets of data were collected for each interviewee:

I. Information collected before interviews – which consists of information about interviewees' organisations, departments and units, their positions and roles, notes taken during previous meetings and telephone calls.

II. The audio recorded interview.

III. The notes taken by the interviewer during the interview and at the end while the audio recorder was off.

IV. The table completed with the interviewee that showed the outcomes of bootleg projects that were not discussed in details (this was carried out at the end of interviews).

Immediately, after each interview, the interviewer reviewed his note to make sure that they were clear and are in line with the issues discussed. Then, each interview was transcribed and then proofread. This process not only helps to improve the data but also enables the researcher to familiarise himself with the data. The anonymity of participants and confidentiality of the discussion was maintained by using codes to refer to interviewees and their organisations and by eliminating any information that might identify organisations and individuals from transcripts and notes.

All the data – including information collected prior to interviews, the interview transcripts, notes taken by the interviewer, and the completed table – were then entered into NVivo 8 software that helped to reduce and analyse the data. Therefore, four different sources of data were created in NVivo to keep each group of data – explained

above – separate and therefore the researcher could be aware of source of data that was being used throughout the coding and analysis process.

In accordance with the realist approach, the analysis began with an impartial, comprehensive read-through, which gave a sense of the data for the initial coding. During this process, the researcher used "annotation" tools in NVivo to reflect on his thoughts and to highlight any points that can be inferred from interviewees' comments but which are not necessarily clearly stated by them. In addition, throughout the interviews, the interviewer often took notes of interviewees' reactions to specific questions or discussion. These specific type of notes were added as annotations to the interview transcripts.

The data analysis was carried out following the approach recommended by King (2004). Open coding was initially implemented - using 75 free and tree nodes – which considered the influence of various elements on bootleggers and their bootleg project at different stages in order to answer four research questions. These initial nodes (codes) were mainly extracted from themes identified from the literature review; or which emerged in the course of the pilot study; or were based on the interview questionnaire; and developed during interaction with the data. Data that could not be coded using existing nodes resulted in the creation of new free nodes and subsequently tree nodes. As the data analysis process was progressing, it was necessary to use hierarchical codes to categorise collected data and clarify differences and similarities in the data. This was where more free nodes were converted to tree nodes and the initial template was developed. Further on in the analysis process, extensive hierarchical coding was applied to enable deeper analysis of the data and the formation of models by the end of coding process. A brief sample of coded data is presented in Figure 3.4. Appendix III also shows more detail of the coding system presented in Figure 3.4.

Figure 3.4: Coding sample
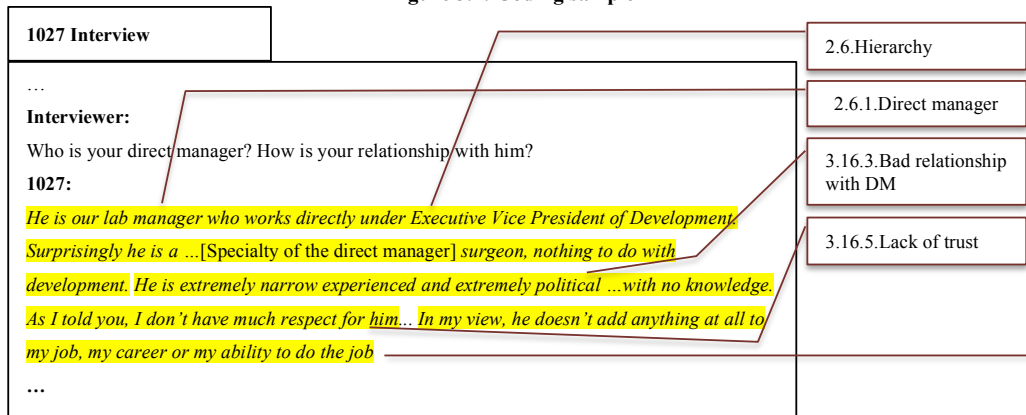
In order to carry out the analysis, each bootlegger – including his/her circumstances and bootleg projects – was considered as a case. Thus, as the first phase of data analysis, within case analysis was undertaken to understand each individual bootlegger's actions and behaviours at different stages of bootlegging and characteristics of bootleg projects. Since this research has tried to answer four research questions that focus on different aspects of bootlegging, this phase of data analysis was undertaken in four separate stages. Each stage focused on one of the research questions. Then at the end of this phase, in order to triangulate the data, the analysed data for each interviewee through the four stages were compared. This procedure was repeated for each interview. The four stages are:

- The first stage investigated why interviewees bootlegging - this is the focus of first research question. Thus, this part of data analyses focused on the steps interviewees take when they come up with a new idea and, (the motivation for going underground), the reason for hesitating to approach decision makers and seek official approval, elements that influence their decision and are considered by them when they decide to go underground. Initially a number of codes were extracted from the literature and the pilot study, but a number of new codes were also created during this process as new themes were identified in this process.

- The second stage focused on how interviewees operate clandestinely. So the research was trying to find what resources were mentioned in the interviews that were required for bootlegging and how bootleggers acquired them: e.g. how much time was required and when interviewees manage to bootleg, what types of resources (raw material, machinery, money, etc.) were needed and how they were acquired, and whether support or expertise were required and how they get them. This stage also was initiated by using codes which were extracted from the literature and the pilot study although a few new codes were also added. This stage also attempted to discover linkages between how interviewees acquire their projects' needs and a variety of issues; e.g. environments and units they work in, level of freedom and access they have to resources, their relationship with their direct managers and other participants, their experience, their position and role in the organisation.

- The third stage targeted the disclosure of bootlegging to understand when interviewees reveal their bootleg projects and what elements influence their decisions. Since there was a significant lack of knowledge on this topic, this stage of data analysis was mainly based on emerging codes arrived at through interacting with the data. The data analysis at this stage was more inductive as the codes were developed throughout the process while new themes in the data were identified.

- The fourth stage analysed collected information regarding the outcomes of bootleg projects and tried to categorise bootleg projects' outcomes. Primarily, some codes were developed based on interview questionnaire and the framework used to identify types of innovation. Additional codes were also developed to analyse data on outcomes of bootleg projects that failed to result in innovation.

The second phase of data analysis was to implement cross case analysis to compare bootleggers and their bootleg projects to identify further themes and pattern in all the data. Following the same stages of single case analysis explained above, cross case analysis was conducted to compare bootleggers and their bootleg projects to discover common pattern in the data as well as difference. As this research adopted a realistic perspective, generalization of data was not its priority. Instead, there was a focus on trying to find the underlying structures and mechanisms that cause similarities and differences in bootleggers and their bootleg projects.

In order to do so, pattern and clustering analyses, which highlight repetition and common patterns in data or fractions of data, were applied to make better sense of the data. As expected, these methods helped to find differences in bootleg cases and find explanations for them. At this phase of the data analysis, new codes were developed, a significant number of codes were grouped and clustered, and all free codes were converted to hierarchy codes. In addition, coding query was applied to test ideas and identify themes. Matrix coding also played a significant role in undertaking a comparison analysis by comparing nodes, sets and attributes. This also helped to translate part of the data – as required - into numerical data, which facilitated comparison analysis. These methods helped to take the data analysis to the next level and identify further themes in the data which were not primarily noticeable. Combinations of qualitative data and numerical data helped us to reach a comprehensive understanding of bootlegging that would not be easy to get at just using each of them alone. The process of cross case analysis continued until the data had been thoroughly analysed. The detail of the data analysis and its findings are presented in Chapters 4, 5, 6 and 7.

3.8. Unit of Analysis

Another issue that must be addressed is the unit of analysis, which influenced research design and implementation. The unit of analysis for this research was the bootlegger. This also indicated that undertaking interviews with individual bootleggers was the most appropriate method of data collection for this research and emphasised the importance of the appropriate sampling method and correctly identifying bootleggers.

The choice of unit of analysis impacted the focus of the interviews and the questions asked. This research focused on the individual bootlegger, their background, their job history, responsibilities, their experience of clandestine activities, and their reasoning and decision-making. Although the interviewees were questioned about their bootleg projects and asked to discuss a project in detail, the focus of the questionnaire developed for interviews (see Appendix II) was to capture the individual's experience of the clandestine process; how they managed these clandestine activities, their reasoning and decision making at different stages of the underground operation, rather than the details of projects, for example how the technology was developed, the number of iterations a design went through, etc.

The unit of analysis also influenced the data analysis process. As explained in the data analysis section (3.7), the data analysis was undertaken in two phases. Since the level of analysis was the bootlegger; the first phase of data analysis considered each bootlegger as an individual case, and then in the second phase of analysis compared all of them as a group (during cross-case analysis).

3.9. Research Quality

Healy and Perry (2000) argued that the quality of any research must be evaluated using criteria relevant to its philosophical perspective. As this study adopts the realist perspective, relevant criteria must therefore be used to judge its quality. Thus, criteria such as validity, reliability and generalisability – which were primarily developed to evaluate positivist research – are not adequate tools for assessing the quality of this research (Neuman, 1997; Seale, 1999; Golafshani, 2003).

A number of researchers have discussed suitable criteria for evaluating the quality of qualitative research, particularly that based on realist paradigms. Miles and Huberman (1994) and Hope and Waterman (2003), for instance, emphasise the need for the reconceptualisation of quality criteria for qualitative research, while Rolfe (2004), on the other hand, claims that it might be more appropriate to reconceptualise qualitative research itself. He believes that each research methodology and individual study must be evaluated according to its own values. Healy and Perry (2000) compare the merits of different paradigms and then propose several criteria for the evaluation of realist-based research. These criteria are applied to evaluate the quality of this study.

The first criterion considers the "ontological appropriateness" of the research. This research focuses on a complex social event, bootlegging, which reflects the ideas and behaviours of the people involved. It therefore adopts a realist perspective – neither as objective as positivists nor as subjective as constructivists in its view of the world – as this seems to be the most appropriate perspective for studying such complicated social phenomena. This perspective remains consistent through the different stages of the research project.

Healy and Perry's second criterion (2000) is "contingent validity" – a substitution for what positivists would call internal validity. Realist researchers study social phenomena in the outside world – not in a laboratory situation – where these phenomena may be affected by a wide range of factors. Realist researchers are more likely to present a series of explanations, reflecting the contexts in which phenomena occur, rather than a generalisable explanation. In order to increase the contingent validity of this research, therefore, care has been taken when discussing bootlegging to underline the contexts in which the phenomenon arises. This is achieved specifically by presenting answers to research questions which are contingent upon context in which bootlegging happens.

The third criterion for evaluating the quality of realist research highlights the epistemological difference between this and other paradigms. Healy and Perry (2000) suggest that while constructivist and critical theorist researchers are "value-laden" and positivist researchers are "value-free", the realist researcher is "value-aware". In other words, realist researchers are aware that reality might not be perfectly apprehensible, so they use the unique perception of each research participant as another window on reality and triangulate data from a range of sources. Unfortunately, the collection of data from a range of sources – for instance, organisational documents and reports or interviews with bootlegging managers – is not practical for this research since bootlegging is mainly pursued clandestinely, it is neither documented nor formally reported, and managers are not informed. Instead, triangulation of data has been attempted by interviewing a considerable number of bootleggers from a wide range of backgrounds and organisations. Open-ended questions were used to explore the context in which bootleggers operate, and one specific project was discussed in detail with each interviewee. Finally, during the research design and interview process a number of

academics were also consulted – the aim here was to capture others' viewpoints on the research and perspectives on bootlegging.

The next criterion concerns the trustworthiness of the chosen methodology. As explained in sections 3.4, 3.5 and 3.6, the methodology chosen for this research is already regarded by researchers in a number of fields as the most appropriate way to study sensitive issues. How this research reduces the influence of the researcher on participants is also explained in Appendix IV. Section 3.4 and 3.5 and appendix IV explain the actions that were taken to encourage bootleggers to reveal the true extent of their bootleg activities. These sections demonstrate that this research is highly auditable and therefore trustworthy.

The final criterion focuses on the purpose of the research. While positivist researchers normally concentrate on running statistical tests and theory testing, realist researchers primarily try to build theory which they then confirm or reject. As becomes clear in the course of this chapter, this study – as a piece of realist research – sets out to answer a series of research questions that help to build theories and frameworks. The frameworks try to demonstrate the underlying structures and mechanisms of bootlegging. It is important to highlight that what we understand and our knowledge of these structures and mechanisms tend to inherent falseness, as the models are the result of our limited knowledge and understanding of the phenomenon (Zinkhan and Hirscheim, 1992). Thus, the model developed may suffer from oversimplification and therefore the phenomenon as is presented in our models may not be replicable by others.

Finally, as a study of a sensitive issue, this research faces several limitations and ethical implications. However, these must not prevent researchers from addressing the topic (Sudman *et al*., 1988; Lee and Renzetti, 1990). Therefore, Appendix IV extensively discusses these difficulties and takes them into account; where possible, strategies are

presented to deal with them; and those difficulties that cannot be overcome are acknowledged as research limitations.

3.10. Chapter Summary

Different aspects of this research projects, including its design and methodology, have been covered in this chapter. In order to justify the choices that had to be made for this research, it was initially explained that this research is ontologically based on the realist philosophy. It was also discussed that as a research project based on realist perspective, retroductive strategy is the most appropriate strategy for this research since it helps to explain the invisible underpinnings of bootlegging (Blaikie, 2007).

Primarily, it was assumed that multiple case studies would be the most appropriate method for this research. However, the first pilot-study faced serious limitations and challenges that prove the chosen research methodology needed to be revised. The main limitation was R&D staff's reluctance to discuss their unsuccessful bootleg projects. On the other hand, interviewing management did not reveal substantial information about bootlegging and getting required information from R&D documents and archives seemed to be impractical. All these limitations indicate the need to use a different research methodology.

Consequently, a search for different research design in other branches of social sciences that study sensitive research topics, e.g. the underground economy and drug abuse, were initiated. Bootlegging seems to be similar to a type of research – called sensitive topics – which is widespread in the fields of economics, criminology, sociology, anthropology, psychology, health and clinical studies. The possibility of undertaking surveys, interviews and, to a lesser extent, ethnography – as the main methods applied for studying sensitive topics – were considered and it was concluded that interview is the most appropriate method for this research.

A semi-structured questionnaire was developed and special care was taken with the design of the interview, given the sensitivity of the topic. The main challenge was still gaining the interviewees` trust, so a number of steps were taken to achieve this. Some of these steps include using face-to-face interviews; reassuring interviewees that the research would not impact on them in any way; approaching interviewees via their network and events that they attended rather than through their organisations; assuring them that the researcher do not and will not have any connection with their organisation; carrying out interviews outside interviewees organisation at weekends or after work in a comfortable place; giving only a general idea of the topic before interview; presenting the researcher and the purpose of this research clearly; gradually introducing the topic during the interview; assuring the interviewees that the interview is confidential and anonymous; asking sensitive question only once it was felt that the interviewee's trust had been gained.

In addition, a short questionnaire in the form of table was also used to capture the outcomes of bootleg projects pursued – during the last two years by interviewees - that were not discussed in detail. This was done at the end of interview when the interviewee's trust was gained and the audio-recorder was turned off. The purpose of this last section of interview was to capture failed bootleg projects and also to give a chance to the interviewee to discuss any issues that s/he may prefer not to have recorded. Although this part of interview is not audio-recorded, the researcher has taken notes of issues raised by the interviewees. A wide range of issues that enriched the data collection was often raised by the interviewees at this stage of interviews.

This research design was also tested by undertaking a pilot study of four interviews which were immediately analysed. The pilot study shed light on some of the drawbacks of interview design that resulted in improving, rearranging and rewording some of the

questions. The pilot study confirmed that this research design is capable of gaining interviewees' trust and collecting the required data. More importantly, it indicated that interviewees were willing to honestly discuss their failures if they were specifically asked to do so.

Networking (snowballing) sampling was conducted as since bootleggers are a '*rare and deviant population*' (Lee, 1993) with no list of population available. Networking sampling was undertaken in two stages: seeking initial contacts and then asking participants for referrals to other bootleggers. The researcher's personal network was primarily used to gain access to the bootlegger community. In addition, the researcher attended several engineering and professional conferences and events to gain more initial contacts. At these events, attendees were questioned in order to identify bootleggers amongst people who work in R&D departments of high technology based companies. Once those initial contacts within bootlegging networks in different organisations were gained, they were to refer the researcher to other bootleggers that they knew (in their organisation or others) at the end of their interviews. Although raising the number of initial contacts has the advantage of decreasing bias in collected data, it caused the data collection process to take more time than expected (18 months instead of 6 months).

Over 600 engineers and scientists who work in research, technology development, R&D and product development of different high technology corporations were questioned in order to identify bootleggers. Among them, 93 bootleggers were identified and contacted to arrange interviews, with only 60 attending an interview which resulted in 55 successful interviews. The other five interviewees either worked too independently from their company or completely denied any sort of unofficial activities

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In order to analyse collected data, interviews were transcribed, proofread and entered to NVivo 8 software which used to analyse data. As explained, open coding and then hierarchical coding were used to this purpose. As the data analysis process was progressing, extensive hierarchical codes were used, free nodes were converted to tree nodes, a template was developed, and pattern coding and clustering coding became helpful. Pattern and clustering coding, which highlight repetition and common patterns in data or fractions of data, helped to translate some data into quantitative form. This quantitative data was then entered into Microsoft Excel spreadsheets to facilitate cross-tabulation analysis. This method, combining qualitative and quantitative data, helped to gain a comprehensive understanding of bootlegging. The unit of analysis for this research is the bootleg projects that were discussed by interviewees.

In order to discuss the quality of this research, an argument is presented that adequate tools for assessing the realistic research must be applied rather than using positivist tools. These adequate criteria are built upon the ontology and epistemology underlying realist perspective. The first criterion concerns adopting a realist perspective throughout the study. The second criterion highlights presenting a series of explanations, reflecting the contexts in which phenomena occur, rather than a generalisable explanation. The third criterion addresses the characteristic of the realist researcher which is being "value-aware". As was mentioned, this research faces some limitations in term of using different sources of data to triangulate data. However, as mentioned above, several methods were used to triangulate data where it was possible. The next criterion concerns the trustworthiness of the chosen methodology; an attempt has been made to demonstrate that this research is highly auditable and therefore trustworthy. The final criterion focuses on the purpose of the research. As will become clear in following chapters, this study – as a piece of realist research – sets out to answer a series of

research questions that help to build theories and frameworks rather than testing

theories.

CHAPTER 4:

RESEARCH FINDINGS AND ANALYSIS

4.1. Introduction

The previous chapter covered the research design and methodology of this project and also justified the choices that needed to be made for the purpose of this research. To continue with the arguments that this research is trying to make, this chapter presents the research findings and tries to support these findings with evidence that has been gathered throughout the research process. It also prepares the foundation required for the next chapter which will present the main discussions of this research by making attempts to answer the research questions.

Thus this chapter presents research findings on the interviewees' characteristics; their environments (including the characteristics of their industry, organisations, departments and units); their work, responsibilities and the circumstances in which they work; and their bootleg projects. All the differences and similarities among interviewees, their environment and work and responsibility that would influence bootlegging are described in this chapter. Thus these descriptions could be used to support the research arguments in the following chapters.

4.1.1. Layout of this chapter

This chapter comprises eight sections. The next section (4.2) covers interviewees' characteristics as they can be considered the characteristics of bootleggers. Then, the chapter continues by presenting the industries that the interviewees are coming from and the differences in terms of bootlegging opportunity in different industries in section 4.3.

The fourth section (4.4) illustrates characteristics of interviewees' organisations and units. The countries, ownership and size of interviewees' organisations are discussed to

investigate any differences in bootlegging in different firms with different characteristics. Besides, management of R&D units in interviewees' organisations – including organisational hierarchy, how R&D decision are made, how employees' ideas are gathered, how R&D budgets are allocated and interviewees' access to resources – are thoroughly discussed. This will help us to understand interviewees' positions in their organisation hierarchy and to understand the environment they work in.

The fifth section (4.5) of this chapter focusses on interviewees' work and responsibility which is a critical issue as it has been used in the different levels of analysing data. This section starts with presenting interviewees' positions and their primary responsibilities. Then this is followed by discussing other responsibilities of the interviewees and how having several projects to work on at a time potentially opens up opportunities for interviewees to bootleg.

The sixth (4.6) section describes the circumstance in which interviewees work. For this purpose it discusses several issues. Having freedom to pursue their interest and ideas and the sources of this freedom are fully covered. This is essential to understanding how bootleggers operate underground. The interviewees' relationships with their direct manager as an element that influences bootlegging at different stages is also thoroughly covered in this section.

Different types of bootleg projects observed in this research are presented in the seventh section (4.7) after introducing a new concept (quasi-bootlegging) and redefines hardcore bootlegging, concepts needed to be able to describes this research data. Therefore, This section discusses different aspects – including typologies – of 55 bootleg projects that were thoroughly discussed by the interviewees. Appendix VI also presents characteristics and typologies of bootleg projects pursued by the interviewees in last two years

Finally the chapter concludes with a summary of data and findings presented in this chapter. The findings presented here are the groundwork the research discussions will be built on in following chapters.

4.2. Interviewees' Characteristics

This section discusses some characteristics of interviewees such as their gender, age, experience, education, interests and enthusiasms. Although this research collected some background information on interviewees such as their age, years of experience, level of education and number of patent applications and publications; this information for each interviewee is not indicated because it could reveal their identity. It must be mentioned that correlations between these elements and different aspects of bootleg projects have been thoroughly investigated and therefore wherever a significant correlation is observed, it has been reported in a way that would not put interviewees at risk of being identified.

4.2.1. Demographic characteristics of interviewees

The majority of interviewees – 50 out of 55 – are male and the remaining five are female. As is clear from the Figure 4.1, they are mainly middle-aged people. All interviewees are over 30 years old and younger than 60 with a majority between 30 to 50 years old.

Figure 4.1: Demographic distribution of interviewees
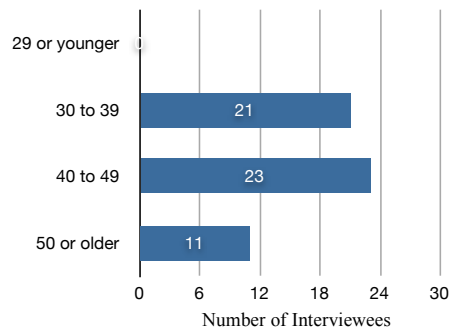
4.2.2. Interviewees' experience and education

The interviewees are highly experienced: 46 interviewees had 10 or more years of experience and 21 had 20 or more years' experience. Figure 4.2 shows interviewees' years of experience engaging in research and development activities. In addition, these interviewees are well-educated as 41 interviewees had a PhD or equivalent degrees, 12 interviewees had a master degree and two interviewees had bachelor degrees.

Figure 4.2: Interviewees' years of experience
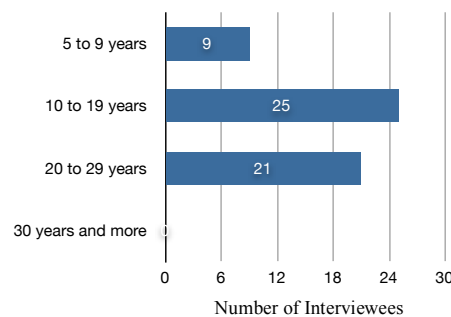
A number of them said they were the "*go-to guy*" in their organisation. This means that if anyone, management or colleagues, has a technical question which falls within their expertise, they were the first person who would be consulted.

Another point raised by some interviewees is that they play a unique role in their organisations and/or in their unit as they have unique education and experience. As a result of their unique experience, they understand issues that no one else understands and they do things that no one else can do. This issue becomes more important in smaller organisations or in the organisation that have a small specialized R&D unit that focuses on a unique technology or market which is different from their core business; for instance, an IT company that has a special unit focussing on telecommunication technology. The point is the people who are normally assigned to work in such

environment have expertise that other people simply do not have, as was mentioned by an interviewee:

> "*My personal experience may be a little out of norm because I am in a very unique position in the company. The technical expertise that I brought to the table is rather rare… my work is unique and it's not understandable for them* [my colleagues]" (1021[57], Middle Manager, Product Development)

4.2.3. Interviewees' enthusiasm

First of all, apart from two interviewees who faced some difficulties in their work environment, the rest of interviewees made comments that imply they are satisfied with their job and work environment[58]. None of the interviewees mentioned that they have any intention of developing their ideas and then leaving their company to join other companies or to approach a venture capital and start a spin off business[59].

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[57] Similar numbers are used a coding system to hide the identity of interviewees. This is defined in Section 4.5.1.

[58] Their comments on different issues such as their relationship with their management clearly reflect the fact that not only did they enjoy their work but also they are more or less happy with their work environment. Although this research did not specifically measured interviewees' satisfaction with their work, they were questioned about the possibility of leaving their work and joining other companies and even launching a spin off business. At the end of the interviews when the audio recorder was off and the interview was not recorded, interviewees were questioned if they consider leaving their companies. Their respond to these questions were always negative.

[59] They highlighted that the nature of their ideas and bootleg projects are not so unique that they could build up a business based on them. For them, the ideas that they follow underground would only make sense and be worth pursuing when they worked in their organisation. In other word, their ideas mainly cantered around improving or creating something related their organisation's business. Lastly, for those who have unique ideas for a new product, for instance, they would need various kinds of expertise to be able to develop the idea further and commercialise them. These skills and the platform required for this

One thing that drew the researcher's attention during the course of the pilot study, was the significant number of patent applications and academic journal and conference papers authored by interviewees[60]. Figure 4.3 shows the number of patent applications and publications authored by the interviewees. As can be seen in this figure, only six interviewees have no patent applications or papers, 19 interviewees have between one and nine patent applications and/or publications; while 30 of them are authors of significant numbers of patent applications and publications. Considering the fact that only three of them have experience of working in an academic environment after completing their PhDs, these numbers demonstrate their enthusiasm for knowledge creations and scientific work.

Figure 4.3: Interviewees' number of patent applications and publications
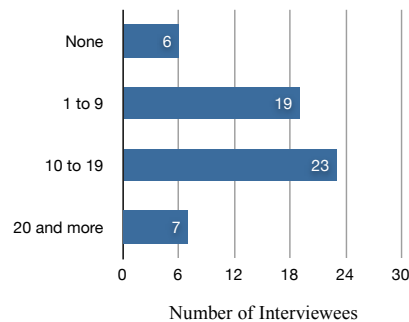
purpose do exist in their organisation and it would not be easy to replicate them in a small spin off business. It must also be highlighted, that although they are such enthusiastic people about the technology and their work, when it comes to running a business or having their own business they lose interest.

[60] Therefore in order to find out more about the characteristics of interviewees, Google Patent and Google Scholar were search to find out more about the interviewees' innovative and scientific attempts. Although the number of patent applications and conference and academic papers might not be a good indication of innovation since they may not necessarily be applied in the organisation, at least they could be considered as an indicator of interviewees' creativity and invention (Roberts, 2007). Therefore, for the purpose of this research, we can argue that the higher number of patent applications and academic papers an interviewee has, the more enthusiastic and self-motivated s/he is about their work.

4.2.4. Summary of interviewees' characteristics

As was discussed, the majority of interviewees are men - 50 out of 55. All the interviewees are over 30 years old and the majority of them between 30 to 50 years old with over 10 years experience in their fields. Therefore they can be considered as experienced people all with a higher education degree, with a significant number of them having a PhD or equivalent. They are motivated people who mainly enjoy working in organisations and they are satisfied with their jobs, specially because of the technical challenges that they work on. They are considered as creative and innovative people in their organisation. Most of the interviewees have authored patent applications. Fascinatingly 30 of them are named as authors or co-authors of over 10 patent applications. This is a good indication that they are very technologically motivated people who prefer to focus on technical issues rather than getting engaged in the business aspects of their organisations.

4.3. Interviewees' Industries

The 55 interviewees come from 34 different companies which can be categorized into four different sectors based on their primary industry:

- Nine from the healthcare industry: these companies either operate in the medical device sector or in both pharmaceutics and medical devices.[61]

- 12 from electrical and electronic sensors and control systems: companies classified in this group may produce a variety of industrial and electronic products such as a variety of sensors, and control systems, etc.

- Seven from Information Technology: This includes companies that focus on computer and Internet related products including hardware and software, etc.

- Six from the telecommunication system industry: This includes companies focusing on telecommunication systems, infrastructures and products; excluding telecommunication service providers.

As is shown in Figure 4.4, 12 interviewees are from healthcare sector; 15 interviewees are from industrial and electronic devices; 16 interviewees are from information technology, and 12 interviewees are from the telecommunications system industries.

One of the early issues that were investigated in the data analysis process was differences among bootleg projects pursued in different industries. The first issue that was highlighted by those who work in the healthcare industry, specially those who are

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[61] Pharmaceutical and medical device companies are categorized in one group as healthcare industries; first because most of these companies operate in both pharmaceutical and medical industries and we can not categorized them merely in one group; second, there are a number of similarities between these two industries, specially in terms of rules and regulation in regard to development of new products.

in the pharmaceutical sector is the limitation they face in regard to developing new products or drugs. This issue was not only highlighted by those are in pharmaceuticals but also discussed by those who work in medical devices. As two interviewees highlight:

Figure 4.4: Number of interviewees from different industries

Number of interviewees
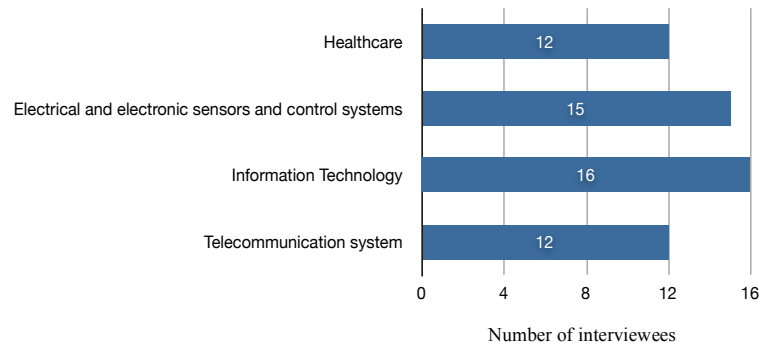
 "*… as you know medical device companies have to have a product development process mandated by the FDA. We have that, so there is no one gatekeeper as a result. Every stage review had needed approval from multiple people depending on stage review itself…*" (1021, Middle Manager, Produce Development)

"*There are a lot of regulatory approvals that a product in our industry would have to go through…*" (1024, Senior Staff, Produce Development)

So the strict rules and regulations that control the development of new products, significantly influence the practicality of undertaking bootleg projects or at least pursuing bootleg projects very far through the development process. These regulations required some standards and quality control test which necessitated bootleg projects becoming official projects. In addition, these regulations make the development process

very long and impose significant expenses on the development process that cannot be found in other industries[62].

On the other hand, there are sectors within the telecommunication industry which focus on newly emerging technologies. In these sectors, industry standards have not been developed so these company are rushing to be the first to propose a solution in the hope that their solution will become the industry standard[63]. In such sectors, the researchers and product developers face very little regulatory constraint however they deal with way more uncertainty in regard to technology, market, and future industry standards[64]. In addition, those whose work in IT industries, specially software developers, seem to have a significant amount of freedom created by the nature of their work as they are easily able to hide their projects from their management[65].

These findings are in line with Pearson's (1997) argument that the opportunity for bootlegging is different in different industries. However the opportunity does not necessarily mean that the extent or the number of bootleg projects are different in different industries. As we go further and discuss other aspects of bootleg projects,

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[62] For instance an interviewee said: "… *you had to do clinical trials and all kind of things and industrialization and file FDA and NDA. Quite a big job and an expensive process to do that for a drug.*" (1027, Middle Manager, Produce Development)

[63] Being first in such industries not only gives the advantage to the company of being ahead of other competitors but also secures their competitive advantage by presenting a solution to the market which becomes industry standard and therefore other competitor have to pay them a royalty in order to use their technology.

[64] This issue is one of the issues discussed by the interviewee 1054 (Middle Manager, R&D) at the end of interview when the discussion was not audio-recorded. The researcher only took a note of this issue and is not able to present a quote.

[65] This issue will be expanded in the Chapter 7 of this thesis where the revealing stage of bootleg projects is discussed.

corelations between industry circumstances and the number and the extent bootleg projects are discussed.

4.3.1. Summary of interviewees' industries

This section presented the industries that interviewees are coming from and their distribution. As was shown, 12 interviewees are from healthcare, 15 interviewees are from electronics and electrical sensors and control systems, 16 interviewees are from IT, and 12 interviewees are from telecommunication system industries. It was also discussed that normally interviewees who work in healthcare industries face more limitations than those who work in other industries and this is mainly because of the strict rules and regulations of their industries. On the other hand, those who work in IT and telecommunication system benefit from having more freedom and opportunity for bootlegging which does not necessarily means the higher number bootleg projects pursued by those who work in IT or telecommunication system industries.

4.4. Interviewees' Organisations and Units

This section presents characteristics of 34 organisations in which 55 interviewees work. Therefore this section first covers where the interviewees come from. It is followed by covering the ownership of these organisations, organisations' size, R&D size, the size of interviewees units and groups. This section also discuss the interviewees' organisation hierarchy, how R&D decision are made, who are the decision makers, how employees are gathered in interviewees organisations, and R&D budgeting and interviewees access to budget.

4.4.1. Organisations from different countries

The interviewees come from 34 organisations from North America, Western Europe and Japan. Figure 4.5 illustrates number of interviewees from different countries. As shown in Figure 4.5 – 40 interviewees come from American companies, 12 come from European companies and three of them come from Japanese companies. This classification is based on the location of their organisation headquarter.

Figure 4.5: Number of interviewees from companies in various countries
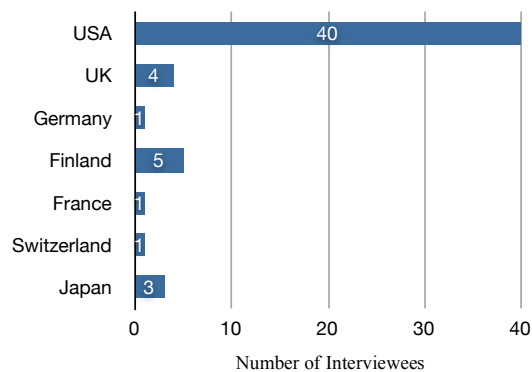
The classification presented in Figure 4.5 is based on geographic locations of interviewees' organisation headquarter. This must be highlighted that – apart from two of four interviewees from UK companies, one from a Swiss company and one from a German company – the rest of the interviewees worked in American divisions of their corporations and therefore were based in United States[66].

In addition, it is worth mentioning that one of the interviewees[67] who is based in an R&D unit away from the headquarters highlighted that being away from the headquarter would help him to bootleg securely without senior management interruption. Although this is not the case of all of the interviewees, it must be considered as it can create environments that increase the chance of bootlegging.

4.4.2. Organisations' ownership

Of 34 companies, only nine companies were privately owned while 25 of them are public companies. This means 12 interviewees are from private companies whereas 43 interviewees work in public companies. This is also shown in Figure 4.6. This research did not find any significant differences in bootlegging between public organisations and privately owned companies.

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[66] It must be mentioned that although I tried to approach engineers and scientists from different countries, more people who worked in American corporations or American divisions of their companies agreed to openly talk about their experience. During the sampling process, I realized that people from Asian or European countries to some extent hesitated to talk about their experiences and their organisation and they were worried about their organisation policy about talking to outsiders. This does not necessarily mean that American employees would bootleg more than employees in other countries. However, it could be said that American employees are more confortable with openly talking about their informal and unofficial experiences.

[67] Although a number of interviewees worked in R&D units that are based in a different geographic location from their organisations' headquarter, only one of them raised this issue.

Figure 4.6: Companies ownership
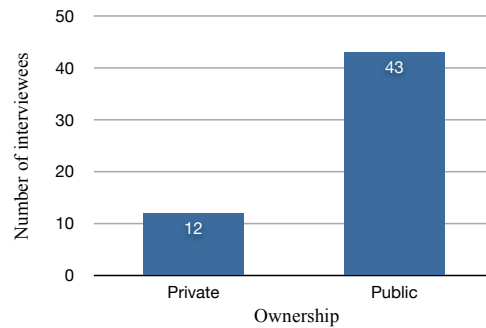
4.4.3. Organisations' size

The 55 interviewees came from 34 companies which are mainly large organisations –
based on both their turnover and number of employees[68]. Based on the number of
employees, five of these companies are considered to be medium size enterprises while
the rest are large organisations[69]. Figure 4.7 shows the number interviewees coming
from different size organisations. As can be seen in this figure, only eight interviewees
came from so called medium size enterprises (based on the number of employees) while
the rest, 49 interviewees, came from large organisations.

Based on these organisations' turnover, three of them can be categorized as medium
size enterprises while the rest are large organisations. Figure 4.8 illustrates number of

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[68] For public companies their website and their 2010 annual reports were used to collect data such as
number of employees, their turnover, etc. For private companies, the companies' websites and/or their
Dun & Bradstreet reports were used to gather this information. These collected data were also double
checked with the interviewees prior to interviews.

[69] To assess the size of organisations and classify them into large and medium size organisation, the
European union definition for Small and Medium Size Enterprise is applied (Retrieved April, 1st 2010,
from: http://ec.europa.eu/enterprise/policies/sme/files/sme_definition/sme_user_guide_en.pdf)

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interviewees coming from different size organisations based on their turnover in the fiscal year of 2010. Only five interviewees are from medium size enterprise whereas the remaining 50 interviewees work in large organisations. Therefore, based on both number of employees and turnover, the majority of interviewees work in large organisations[70].

Figure 4.7: Size of companies based on their number of employees

Figure 4.8: Number of interviewees coming from different size organisation size based on their turnover for 2010 fiscal year

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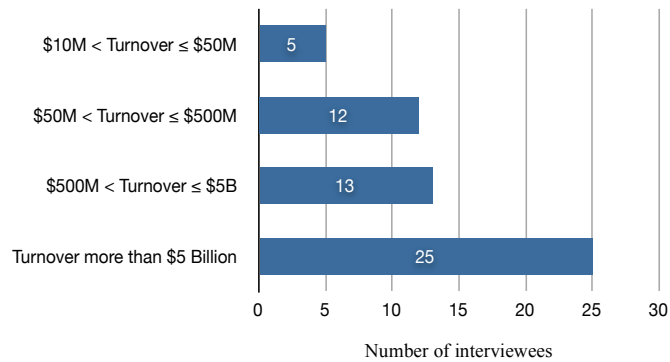
[70] Only three organisations are considered as medium size organisations based on both number of employees and turnover while two other organisations are considered to be medium size organisations merely based on their number of employees.

Through the data analysis process, differences in bootlegging in different organisations based on their size were investigated. This did not find any significant differences in bootlegging between medium size organisations and large organisations. The only issue that may be worth mentioning is that in medium size enterprise, employees have relatively more access and chance of direct contact with senior management or decision makers in regard to R&D projects.

4.4.4. Organisations' R&D department size

The size of R&D department in these 34 organisations was also investigated for the purpose of this research. Normally, the larger the organisation, the higher number of people who work in R&D[71]. Table 4.9 considers four groups' size of organisation related to their number of employees in R&D departments and shows the number of interviewees coming from each group.

Nine interviewees worked in R&D departments with 30 to 99 employees, this group includes the smaller organisations in our sample. 24 interviewees come from organisations R&D department with 100 to 999 employees and there are 22 interviewees who worked in organisations having over 1000 employees in their R&D departments. Normally in larger organisations, there are several departments in charge of R&D activities that have different activities; they either focus on different products

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[71] R&D departments includes Research Departments, Technology Development Divisions, Research and Development Departments, and Product Developments. In smaller organisation, there is normally one R&D or Product Development Department which is responsible for the research and development activities. While in smaller organisations all the similar activities are normally done by a group of R&D or product development, in larger organisation there are often several departments in charge of different activities such as research, technology development and product development.

or are in charge of different parts of the R&D process – e.g. research, technology development or product developments.

Figure 4.9: R&D size based on the number of employees
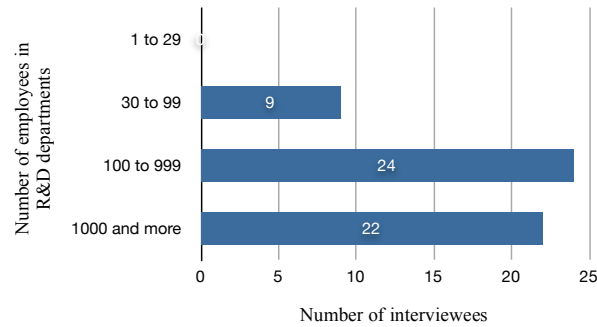
4.4.5. Interviewees unit or work group

In larger organisations where R&D activities are pursued in several departments, they are often run differently with different managers applying different management styles. These departments often have different cultures and the nature of their work may vary, some focus on research, others focus on product development[72]. Therefore in order to consider the environment that interviewees work in, this research needed to consider the unit or group that interviewees are part of, which normally includes a proportion of their whole R&D departments. Therefore interviewees were questioned about the size of their group. As is shown in Figure 4.10, 16 interviewees work in small group, one to nine members. These interviewees are either from product development or R&D units in their organisations focusing on specific products or markets. A large group of

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[72] Further in this paper where the primary role of interviewees will be discussed, it will be shown that interviewees work in different units based on their primary responsibility which provides them different possibility for bootlegging.

interviewees – 26 of them – work in group with 10 to 99 employees. There are only 13

interviewees who work in groups or units with over 100 – and less than 250 members.

All 13 interviewees who work in such large groups are those whose primary

responsibility is research.

Figure 4.10: Interviewees' unit or group size based on the number of members
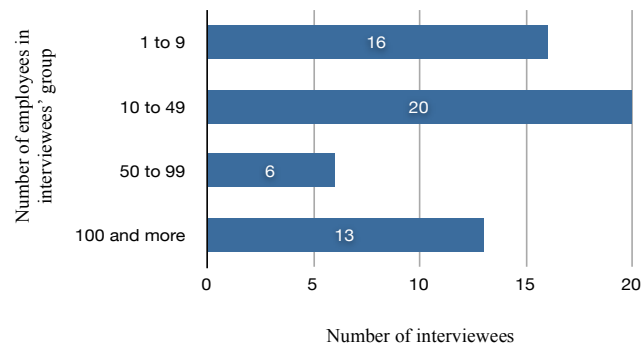
4.4.6. Management of R&D

This section covers three different aspect of interviewees' units: first how R&D

decisions[73] are made in the organisation and the unit where interviewees work

considering their organisation hierarchy; second the methods of managing R&D

activities; third how the R&D budget is assigned to different projects.

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[73] There are certain types of R&D decisions that this research is concerned with. These include decisions to approve and reject R&D projects, to allocate time and resources to different R&D projects, and to choose direction for R&D projects.

4.4.6.1. Organisation hierarchy and R&D decisions

All interviewees work in organisations with three to five levels of managements[74]. When it comes to R&D direction and more general decisions, as was expected this type of decision is limited to the president, chief executive officer (CEO), chief technology officer (CTO), vice presidents (VP) of R&D, VP of technology, other board members or a group senior management including those mentioned here. Obviously interviewees are not involved in such decision.

However the main concern of this research when R&D decisions are discussed is the approving or rejecting of a project – especially bottom-up projects – and the allocating of a budget. This type of decision, in relatively smaller organisations, are directly made by the CEO, CTO or a Vice Presidents such as VP of R&D or VP of Product Development, etc. This is the case for nine interviewees. For the rest of interviewees – 46 interviewees – such decisions are normally made by a group of senior management. Only in 4 cases was the direct manager of interviewees a member of the group that accepted or rejected projects for the R&D departments. In the other 51 cases even the direct line manager of the interviewees had no say[75]. The most important point that must be highlighted here is that none of the interviewees is in a position to make such

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[74] The hierarchy of interviewees' organisations are discussed with them for several purposes: first to understand how R&D decisions – such as accepting or rejecting R&D projects – are made, second, to find out what level of management are involved in these sorts of decisions, and third to figure out how R&D budgets and staff time are allocated. Then it was important to see if the interviewees were involved in this type of decisions or if they could influence such decisions.

[75] Although this type of information is not specifically presented in the thesis – in order to maintain anonymity of interviewees – it was considered while the data was analysed.

decisions. In most cases, not even the direct managers of interviewees were able to singlehandedly make or influence such a decision[76].

4.4.6.2. Decisions on R&D projects

One of the issues in regard to managing R&D is where the majority of R&D projects come from. For 27 interviewees, the primary source of projects is the marketing department and/or needs highlighted by the customers. Therefore their projects are mainly top-down projects which are assigned to one person or a group of staff to do based on a project defined by marketing or sales departments. For instance an interviewee mentioned:

> "*Most of the upper level decisions are made by marketing manager, product manager and category manager. The marketing manager usually proposes a direction and opportunities in the market and based on the direction different groups are asked to solve the given problem and come up with a new product for that particular market. I think, based on the nature of business, decisions are made by different people on top*" (1004, Staff, Product Development)

For two of the interviewees who work in medium size software companies, they have one or few core products and the most of the R&D projects are about customizing core products based on customers needs and their requests.

On the other hand, there are five interviewees who work in research units or technology development units where the primary focus is to develop advanced technology.

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[76] Interestingly when it comes to group decisions, in 16 cases, a manager from the marketing department participated in decisions to approve or reject projects. This is more common among organisations where the primary focus of their R&D or product development is to address market pull rather than technology push types of projects.

Normally, as is highlighted by the interviewees who work in such environments, a significant number of R&D projects are bottom-up projects that are approved by the management. Staff who work in these units are expected to come up with new ideas for new projects and present them to the management and then when they are approved they can pursue them. As highlighted by one of them:

> "*The way our work proceeds is generally we try to generate a further looking direction (4-5) years out to see where the industry is headed and we build internal consensus. Internal to make sure that people agree that this particular direction is worthwhile at which point we effectively start doing work general high level technology development that proceed over a course of a couple of years. If that particular direction starts gathering speed and consensus, we will also initiate a couple of activities*" (1046, Staff, Technology Development)

For the rest of interviewees their primary source of projects cannot be simply distinguished as was explained above. Their R&D projects are a mixture of bottom-up and top-down projects which may be defined by senior management, different business units, marketing, etc. For instance:

> "*Depends on the project. Some project they* [management] *decide. For those projects the real deciders are the business units which are separate from research. So they are the real decider and the director always go along with them... sometimes they dictate what they need and that always comes from business unit... Other times we come up with an idea by ourselves and we present it to them and if they like it they give us money.*" (1053, Senior staff, Research)

In addition to choosing the projects for R&D, there is another issue that is also discussed by interviewees in regard to managing R&D activities in their organisation that is the method of managing on-going projects. For three interviewees, project management is primarily the method applied to running R&D projects, whereas in the rest of the organisations they apply stage-gate processes or a similar approach combined with project management. In terms of the person who plays the role of gatekeeper to the projects, five of interviewees who have managerial roles are in the position to play gatekeeper for smaller projects. For 28 interviewees, their direct manager plays the role of gatekeeper whereas for the remaining 19 interviewees other managers such as lab manager, lead engineer, domain manager, director of R&D or VP of R&D play the role of gatekeeper.

4.4.6.3. Gathering staff's ideas

Another issue that was investigated by this research regarding managing R&D which may influence bootlegging is whether the interviewees' organisations have any official system to gather employees' innovative ideas to improve a product or a process or to create a new product process. So, interviewees were asked if they have any special system – either online or offline – where they can submit their ideas to the management to be reviewed.

Out of 55, 20 interviewees answered that they do not have such a system in their organisation. 17 interviewees answered they have an official channel for submitting ideas that need to be patented so they submit this specific type of ideas – to be reviewed by the patent submission panel, for instance – rather than ideas that can instantly be applied in the organisation. Four interviewees answered that they have an official system for submitting their ideas however three of them also highlight the need to

follow-up their ideas through personal networks and informal ways. Even in these situations employees prefer to talk to their direct manager to get him/her on-board and then talk to the decision makers. As two of them stated:

"*People prefer to talk to their direct report which is more frequently used as the way of pushing ideas up. Unless you are applying for patent which in this case it has to go through the formal process*." (1031, Senior Staff, Research)

"*As I said, you would talk to your manager and he would present it senior management*." (1050, Senior Staff, Research)

Finally, 14 interviewees answered that they have such a system for gathering different ideas from employees; however they prefer not to use this system for the following reasons: the system is vague and R&D staff do not understand what happens to their ideas, it's time consuming, they submit their ideas and they would never hear what happens to the idea, there are shorter ways to get approval for the idea, ideas get ignored, etc.[77]; for instance:

"*Well, when I was new, I was submitting about one a week. And when nothing happen, that dropt off; and I started just doing my own little thing ...then, I basically gave up on all of this*." (1014, Senior Staff, Product Development)

"*There is a lot of politics about that…*" (1019, Senior Staff, Research)

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[77] An interviewee mentioned that the system would not work for every one. He stated:

"*It's not same for everybody. It works well for some people and not good for others. If you have good reputation and good relationship with certain people it would work better for you than others*" (1026, Middle Manager, Product Development)

4.4.6.4. R&D Budget and interviewees' access

In regard to R&D budgets, allocation between different projects was explored. When discussing R&D budgets with interviewees it was important to understand how the budget was allocated (whether it was done annually or more project oriented), what happened to projects that occur between two planning periods, and whether the interviewees have access to significant financial resources.

As was expected, all 34 organisation periodically (annually, semi-annually, or quarterly) assigned a budget for R&D projects[78]. The issue that was important for this research to investigate was what happened to the projects that emerged between two planning periods. For 17 interviewees when such a project emerges, it has to wait until the next planning period in order to get the required budget. Of these 17 interviewees, two mentioned that if a project emerges based on a customer request, the decision maker would allocate a line credit to be able to provide the required budget for pursuing the project.

The remaining 38 interviewees mentioned that there is a specific proportion of their R&D budget that is not allocated for any specific project beforehand. This budget can be used to finance any unpredicted project. This type of budget is named differently in different organisations, e.g. "*blue sky budget*" or "flush fund". There are only three

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[78] An issue that was raised by a number of interviewees is the current economic recession which has significantly influenced interviewees' organisations and their R&D activities. While 26 organisations out of 34 organisations that interviewees came from faced R&D budget cuts, there are eight companies that either have maintained their R&D budget or have had a steady increase in their R&D budget during the last two years. Even in those organisations that did not experience R&D budget cuts, they seem to be more careful about their assigning R&D budget to projects. They are more careful about which projects are funded and the criteria for assigning budget to projects have become stricter.

interviewees (1009, 1021, 1036) who have access to this type of resource and are able to sign off to authorise using this type of money. It should be also highlighted that even these three interviewees face some limitations in using this type of budget and if they decide to use it, they need to report how and where they expend this money.

The point that is important to highlight here is that a good majority of the interviewees do not have direct access to this type of budget. For those who work in organisations where there is loose budget for financing unpredicted projects, in order to get access to such financial resources, they mainly need approval from a senior manager. Six interviewees mentioned that this process is informal and they just need to convince their management. Only six of these interviewees could get such resourses via their direct manager. One interviewee highlighted that this budget is not tightly controlled and he can get some funds if he needs them. On the other hand, one interviewee said the process is too complicated and it is not easy get access to this type of funding.

In addition to the discussion above, there are three interviewees who face relatively unusual circumstances. Two of these interviewees work in a relatively loosely controlled environment where they are given an annual budget which is strictly tied to specific projects. These two interviewees are given a specific amount of money. At the end of planning period they will show on what projects they have spent the money. By the end of a budget period, if they have not fully used their given money, they will receive less amount of money for the next period. This drives them to explore more directions, run different projects in order to maintain their funding or to get more money.

There is also one of the interviewee – 1046 – who works with in a skunk works group. In their unit, there is skunk works project which is run by a senior manager – VP of Technology Development. This project has a different line of credit and faces no

limitation to access to resources and funding. The unique characteristics of this group is that they do not need to report why they need the specific resources that they want and they are given almost unlimited access to resources for this specific project. Having worked in such a unique group on such a specific project gave the interviewee access to resources that he can use for pursuing his own projects.

4.4.7. Summary of interviewees' organisations and units

First of all, it was explained that the majority of the interviewees either work for US corporations or work in the US divisions of their corporation. There are few interviewees who work for European and Japanese corporations. In terms of ownership of these companies, only 12 interviewees work for privately owned companies while the rest are employed by public companies. Besides, the vast majority of interviewees come from large corporations, only few of them work for medium size enterprises.

The size of R&D units and interviewees' group size was also demonstrated. As was discussed, the majority of interviewees come from organisations with relatively large R&D units including more than 100 staff. However when it comes to their group size, they normally work in small groups.

Interviewees work in organisations with 3 to 5 layers of management while they are positioned at the bottom of their organisation's hierarchy. R&D decisions such as accepting and rejecting projects, allocating budget and assigning budget are normally taken by one person or by a group of senior management. Not only are interviewees not able to make this type of decision but also their direct managers are not able to make such decision singlehandedly either. Therefore, the interviewees do not have any influence on such decisions.

In terms of primary source of R&D projects, 27 interviewees work in units where their R&D projects are normally defined by marketing departments to address markets and customers. On the other hand, for five interviewees whose companies focus on research and technology development, most of the projects are technology oriented and therefore many bottom-up ideas turn into R&D projects. For the rest of interviewees, their projects are a mixture of bottom-up and top-down projects. Another issue discussed was having a projects management system or stage-gate process. It was discussed among organisations that have stage-gate process, for 28 interviewees their direct managers play the role of gatekeeper whereas for 19 interviewees other managers in their organisation play this role.

Having an idea submission system that allows interviewees to submit their ideas was also covered. Only 14 interviewees had such a system in their organisation and as was discussed even those interviewees prefer not to submit their ideas when they come up with a new ideas and instead follow them through more informal channels.

The final issue discussed in this section was the R&D budget and interviewees' access to additional funding that might be used for bootlegging. It was shown that R&D budgets are normally tightly allocated on periodic bases. There were only three interviewees who have budgets such as a "*blue sky budget*". Even those interviewees needs managerial approval to access this type of budget. There were also six interviewees who could approach their direct managers to get financial resources for their projects. Further there is one interviewee who works with a skunk works group which increases his access to loose budget. In general, interviewees face challenges if they need funding for their unofficial projects such as bootleg projects. The chapter continues with the following section presenting research finding on interviewees' work and responsibilities.

4.5. Interviewees' Work and Responsibilities

This section covers four issues in regard to the interviewees' work and responsibilities. It first presents interviewees' positions in their organisations and their primary responsibilities; then it covers the other responsibilities of the interviewees. Exploring interviewees' positions and primary responsibilities will help to explain several differences in bootleg projects pursued by interviewees. Finally, it highlights the fact that interviewees concurrently run several projects which helps us to understand how they create spare time to pursue bootleg projects.

4.5.1. Interviewees' positions and primary responsibilities

The interviewees can be distinguished based on their positions and their primary responsibility (the responsibility of their units) in different groups as is shown in Table 4.1. Based on their positions, they are divided into the three categories of staff, senior staff and middle managers. The 55 interviewees included 27 staff (such as engineers, scientists, researchers and technical staff); 15 senior staff (such as senior engineers, researchers and scientists); and 13 middle managers (such as lead engineers) who are not in a position to make critical decisions[78].

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[78] This was discussed in section 4.4.6 that not only are interviewees unable to make significant R&D decisions – such as to kill or approve projects or allocate significant budget to projects – but also in the majority of cases, even their direct managers cannot make such decisions singlehandedly.

Table 4.1: Positions and primary responsibilities of Interviewees					
	Research	Technology Development	Research & Development	Product Development	**Total**
Staff	7	2	7	11	27
Senior Staff	7	1	1	6	15
Middle Manager	2	0	3	8	13
Total	16	3	11	25	55

Key: **Staff** includes engineers, scientists, researchers and technical staff. **Senior Staff** includes senior engineers, senior scientists, principle staff, and senior researchers. **Middle Manager** includes lead engineers, directors of engineering, R&D program managers, managers of advance development, etc. who are normally in charge of up to 5 technicians, researchers or engineers. **Research unit:** the primary focus of staff in these units is to pursue research and technology development. **Technology development unit:** employees in these units normally look to develop technology for their organization or industry. **R&D unit:** R&D staff responsibility is a mixture of research and product development. **Product development unit:** the primary focus of staff in these units is to develop a specific product or a range of products.

The interviewees can also be classified into four categories based on their primary responsibilities (or their group responsibility): 16 interviewees work in groups in which pursuing research is their primary responsibility, 3 interviewees' role is to develop technology; 25 interviewees primarily focus on development of specific products, and 11 interviewees' responsibilities are a mixture of research and development activities. The range of responsibilities of interviewees is different from researchers to product developers[79]. It will be shown that those whose responsibilities are to pursue research

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[79] The following quotes explain different types of interviewees' responsibilities – respectively research, technology development, R&D and product development:

"*The official job description is, I am a research scientist which means that I need to do research, to deliver some research that goes to the product team and write papers ... also to interact with my fellow researchers in academia and industry.*" (1018, Staff, Research)

"*I work with a small group called advanced technology. It is more technology developers. As the product development is working to pushing the first product out, we are developing technology.*" (1008, Senior Staff, Technology Development)

"*I'm supposed to develop the product of the future and I have to look at the trends both in medical and the industrial fields that could fit to our market. Then develop the ideas that could be our future ideas. So it could be only technical feasibility or medical project that lead to a technical solution. My range of motion is really big. Because I should have a broad vision about techniques and medical applications.*" (1035, Staff, R&D)

projects or technology development have less structured work and they have way more freedom in comparison to those whose work is product development.

Table 4.2 shows the position and the primary responsibility of each interviewee and the industry of their organisations. As is shown in the Table 4.2 and following similar tables, each interviewee is given a unique code that is used to refer to that specific interviewee only. These codes are consistent through out the thesis.

"Basically my responsibilities are to take care of design and early production of a certain machine… It is mostly product development. We are usually given certain specifications, the machine is supposed to do this and have this much force. I usually do mechanical design. But sometimes for certain aspects of a machine, we need to do research on or try some applications with an early prototype… I do some research type of work too, not very often." (1025, Staff, Product Development)

Table 4.2: Interviewees' position, primary responsibility and industry

Code	Positions	Responsibility	Industry
1001	Staff	R&D	Healthcare
1002	Senior Staff	R&D	Electrical and electronic sensors and control systems
1003	Middle Manager	Product Development	Information technology
1004	Staff	Product Development	Electrical and electronic sensors and control systems
1005	Staff	Research	Healthcare
1006	Middle Manager	Product Development	Electrical and electronic sensors and control systems
1007	Middle Manager	Product Development	Electrical and electronic sensors and control systems
1008	Senior Staff	Technology Development	Healthcare
1009	Middle Manager	R&D	Electrical and electronic sensors and control systems
1010	Middle Manager	Product Development	Healthcare
1011	Senior Staff	Product Development	Electrical and electronic sensors and control systems
1012	Staff	Product Development	Electrical and electronic sensors and control systems
1013	Senior Staff	Product Development	Healthcare
1014	Senior Staff	Product Development	Healthcare
1015	Middle Manager	Product Development	Electrical and electronic sensors and control systems
1016	Staff	R&D	Information technology
1017	Staff	Product Development	Information technology
1018	Staff	Research	Telecommunication
1019	Staff	Research	Information technology
1020	Staff	Research	Electrical and electronic sensors and control systems
1021	Middle Manager	Product Development	Healthcare
1022	Staff	Product Development	Electrical and electronic sensors and control systems
1023	Staff	Product Development	Telecommunication
1024	Senior Staff	Product Development	Healthcare
1025	Staff	Product Development	Electrical and electronic sensors and control systems
1026	Senior Staff	Research	Telecommunication
1027	Middle Manager	Product Development	Healthcare
1028	Senior Staff	Research	Information technology
1029	Staff	Product Development	Information technology
1030	Staff	Technology Development	Telecommunication
1031	Senior Staff	Research	Information technology
1032	Staff	Product Development	Healthcare
1033	Middle Manager	Product Development	Healthcare
1034	Senior Staff	Product Development	Information technology
1035	Staff	R&D	Healthcare
1036	Middle Manager	R&D	Electrical and electronic sensors and control systems
1037	Staff	R&D	Information technology
1038	Staff	R&D	Information technology
1039	Senior Staff	Product Development	Information technology
1040	Middle Manager	Research	Telecommunication
1041	Staff	Product Development	Electrical and electronic sensors and control systems
1042	Staff	Research	Telecommunication
1043	Staff	R&D	Information technology
1044	Middle Manager	Research	Telecommunication
1045	Staff	Research	Telecommunication
1046	Staff	Technology Development	Telecommunication
1047	Senior Staff	Research	Information technology
1048	Staff	Product Development	Electrical and electronic sensors and control systems
1049	Senior Staff	Research	Telecommunication
1050	Senior Staff	Research	Telecommunication
1051	Staff	R&D	Information technology
1052	Staff	Product Development	Information technology
1053	Senior Staff	Research	Information technology
1054	Middle Manager	R&D	Telecommunication
1055	Staff	Research	Electrical and electronic sensors and control systems

4.5.2. Other responsibilities of interviewees

The interviewees' responsibilities are not normally limited to those mentioned above. All of them have a range of different responsibilities which influence their spare time and the possibility of using their time to pursue their interests.

One of the tasks that needs to be done by the interviewees is to write reports and produce documents as required. For those who work in the healthcare industry, this is more time-consuming as they are required to formally record the process of research and development. Another responsibility that would take time from all of the interviewees is attending meetings and cooperating with other departments and units in their organisations, as an interviewees mentioned:

> "*Since we are most structured we have a lot of file work action to do. We have a lot of quality issues and we are most structured, so I can't have 100% of my time on innovation. I have 30% of my time for innovation and 70% for supporting several departments in the company and going to the meetings…*"
>
> (1035, Staff, R&D)

Some interviewees are sent to conferences and events and may also be allowed to directly interact with customers. They may be sent to academic or professional conferences to present their research projects, see what competitors and academia are working on, and to interact with other engineers and scientists. Others are sent to exhibitions and trade shows where their suppliers, customers or competitors may attend. The following comments are common among those who are sent to conferences and events:

"… part of my job is to discover opportunities. So that's a strong point about why I get sent to trade shows, to be able to look at the competitors and see if there are any opportunities for us". (1002, Senior Staff, R&D)

"My role in the CTO office is to look forward to develop the technologies that may or may not become the industry standard. To do so, we do research, attend conferences, and talk to customers…" (1030, Staff, Technology Development)

For those who have a managerial role, they might have a few employees to manage and maintain certain facilities which add to their responsibility, as is clear from the following comment:

"Mainly research, so I'm just suppose to address the needs of the company. So if they [business units] *have some needs for some future products, we try to find the solution. So it is also to do research to see if we can come up with new ideas and we have to write a lot of patents and make our work visible. Also as a manager I am in charge of facilities and clean room facilities and … facilities. So I have to make sure it is running and if they are broken …of course if there is a meeting I have to go to the meeting"* (1040, Middle Manager, Research)

Among interviewees, 13 of them have a managerial role. One is in charge of 12 employees, another one is in charge of eight staff, two of them are in charge of five employees, one is in charge of four employees, three are in charge of three staff, two are in charge of two and the remaining two managers are not in charge of any of their colleagues. Having few direct reports gives them an opportunity to involve themselves in their official and unofficial projects and take advantage of them to pursue bootleg projects. This will be expansively discussed when we discuss the issue of participants in bootleg projects.

4.5.3. Pursuing concurrent projects

To understand the level of freedom and flexibility of interviewees, they were questioned about how many project they pursue simultaneously. Normally interviewees have more than one project to work on at any one time. Seven interviewees have one main project and several relatively smaller or less important projects on the side. Others have two to eight major projects simultaneously going on. As is highlighted by the interviewees, it is up to them how they allocate their time to different projects. None of interviewees received rigid structure from their superior upon allocating their time to different projects, however they may have deadlines which limit them. The following is typical observations:

> "*Pretty much everyone has a lot of work to do and we sort of have to manage time more or less on our own. We are very self-managed. Very little micro management going on in the company. Almost everyone – not in the company but in the R&D division in the labs – has a PhD and we have very few managers. So I have three main projects and couple of side projects and sort of day to day I need to decide what deadline is coming up and so on.*" (1050, Senior Staff, Research)

Therefore, as is clear from the following comments, it is up to interviewees to decide how they are going to spend their time. The only proportion of their time that seems to be out of their hand to manage is the time they spend in meetings; this was highlighted in the previous sub-section where the different tasks of interviewees were discussed.

They need to prioritise their projects and then allocate their time to them. There are only two types of limitation they often face in regard to allocating their time; one is when they have a deadline and they need to complete a project by its deadline, the other

limitation is when they receive an urgent project which is prioritised by the management. In such cases they have to focus on the project that is specifically prioritised until it reaches its deadline. Normally in such a situation they suspend other projects, specially the unofficial ones, and focus on the prioritised projects.

> "*I work on many projects. I have to divide my time. I have flexibility. Of course if there is a meeting I have to go to the meeting and if there is a deadline I have to focus on and concentrate 100% of my time on the deadline. But in normal time, I can divide up my time*" (1052, Staff, Product Development)

As is clear from above comment, unless interviewees are under pressure to complete a project that is close to deadline, they have flexibility in regard to prioritising the percentage of their time they spend daily on different projects they are involved in. This can potentially give them freedom to pursue their interest and their ideas. It will be discussed in the following section of this chapter how interviewees take advantage of the flexibility to pursue their bootleg projects.

4.5.4. Summary of interviewees' work and responsibilities

The interviewees include 27 staff, 15 senior staff and 13 middle managers[80]. The primary responsibilities or interviewees' unit's responsibilities are also different. 16 of them work in research units, 3 of them are in charge of technology developments, 11 of them work in research and development units, and 25 of them come from product development units. The responsibilities of interviewees who are in product development are very different from those who are in research units. In addition, the work

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[80] It was previously explained that interviewees who are middle manager are not in a position to make critical decisions such as approving or rejecting R&D projects and allocating budget to them.

environments of those who pursue research projects or technology development vary from those who focus on product development.

There are normally additional responsibilities and tasks that must be done by the interviewees. All interviewees spend a significant amount of their time doing required tasks, such as writing up reports and producing documents. This is different from unit to unit, organisation to organisation and industry to industry. Another time consuming tasks for interviewees is attending periodic and unscheduled meetings. Those interviewees who have managerial roles have additional responsibilities related to their position. However such roles normally give them some freedom and opportunity for bootlegging. There are interviewees who are also sent to conferences and trade shows.

Normally interviewees have more than one project to work on at the same time, some have one main project and several projects on the side. Normally it is up to interviewees to decide when and how to work on each project. However, if they were approaching a deadline, they would have to focus on that project. As is highlighted by the interviewees, it is up to them how they allocate their time to different projects. It was also discussed that normally when interviewees pass a deadline they might have some slack time that they may spend on unofficial projects such as bootlegging.

4.6. Interviewees' Circumstances

This section tries to describe interviewees' circumstances mainly from freedom perspectives. Thus it first investigates whether the interviewees are given freedom to pursue their interest and ideas. If they have such a privilege, it is important to understand the nature of this freedom. The second issue that is presented here is the interviewees' relationship with their direct managers. This is another significant issue that influence interviewees' perception about their work environment and what they can and cannot do. In addition, interviewees' ability and willingness to pursue reject projects – which that is a good indication of their freedom – that is covered in Appendix V. This research investigates how interviewees with different level of freedom act and make decisions at different stages of bootlegging.

4.6.1. Freedom to pursue their interests and ideas

To understand the different stages of bootlegging and decisions made by bootleggers, it was important to understand whether interviewees have freedom to pursue their interest and ideas and if they have, what the sources of this freedom are. Thus, interviewees were questioned as to whether their management gave them freedom to pursue their interest and ideas. If their answers were positive, they would be asked why they would get freedom. If their answers were negative, they were asked if they could create room for themselves to pursue their interest and ideas. As can be seen in Table 4.3 which summarises interviewees' responses to this question, some interviewees are formally

allowed to pursue their interest and ideas, for some of them it is informally[81] recognised

that they can do so, and the rest are not allowed to do so.

There are only 13 interviewees who mentioned that they are formally allowed to pursue

their interests and their ideas. This is possibly because it is understood in their

organisation that these people need more freedom. This privilege is either results of

their good reputation and good relationship with their management for their group or

limited to their units. Fascinatingly, only four of these 13 interviewees have an official

strategy, in their organisation, that specifies a percentage of interviewees' time to

pursue their interests and ideas[82]. Those who are allowed to spend a percentage of their

time to work on their interests do take advantage of this privilege, as is highlighted by

one of them:

> "... It is officially supposed that we can spend 20% of our time but nobody ever
>
> says that ... every Friday you get to work on them. It is ok to work on them as
>
> long as you do your other stuff...." (1009, Middle Manager, R&D)

21 interviewees, on the other hand, claim to be informally given freedom to pursue their

interests and ideas. There are again several similar reasons mentioned by the

interviewees as to why they are informally given this freedom. This could be because of

the nature of their work, their reputation and previous accomplishments and/or their

good relationship with their management and trust between them. Similar comments are

commonly made by this group of interviewees:

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[81] The fact that they are formally or informally given freedom was specified by the interviewees. Where they did not mention anything in this regard, the interviewee specifically questioned them on this matter.

[82] This is similar to the strategy in 3M and Google - explained in literature review chapter - that allow employees to spend 10 to 20 percent of their time on their interest.

Table 4.3: Freedom to pursue their interests and ideas

Code	Positions	Primary Resp.	Industry	Freedom is given by management*	Reasons of having freedom				
					Percentage of their time	Nature of work	Reputation	Management trust	Specific to their group
1001	Staff	R&D	Health.	No		✔			
1002	Senior S	R&D	E. S. C.	Informally			✔		
1003	M M	Pro Dev	IT	No		✔			
1004	Staff	Pro Dev	E. S. C.	No		✔			
1005	Staff	Research	Health	Informally		✔			
1006	M M	Pro Dev	E. S. C.	Informally			✔		
1007	M M	Pro Dev	E. S. C.	No					
1008	Senior S	Tech Dev	Health	Informally		✔		✔	
1009	M M	R&D	E. S. C.	Formally	✔				
1010	M M	Pro Dev	Health	Informally		✔			
1011	Senior S	Pro Dev	E. S. C.	No					
1012	Staff	Pro Dev	E. S. C.	Informally		✔			
1013	Senior S	Pro Dev	Health	No					
1014	Senior S	Pro Dev	Health	No		✔			
1015	M M	Pro Dev	E. S. C.	No		✔			
1016	Staff	R&D	IT	Informally		✔			
1017	Staff	Pro Dev	IT	No					
1018	Staff	Research	Telecom	Informally		✔			
1019	Staff	Research	IT	Formally		✔			✔
1020	Staff	Research	E. S. C.	Formally		✔			
1021	M M	Pro Dev	Health	Informally				✔	
1022	Staff	Pro Dev	E. S. C.	No					
1023	Staff	Pro Dev	Telecom	No					
1024	Senior S	Pro Dev	Health	Informally		✔		✔	
1025	Staff	Pro Dev	E. S. C.	No					
1026	Senior S	Research	Telecom	Formally		✔			
1027	M M	Pro Dev	Health	No					
1028	Senior S	Research	IT	Informally		✔			
1029	Staff	Pro Dev	IT	No					
1030	Staff	Tech Dev	Telecom	Formally		✔	✔	✔	
1031	Senior S	Research	IT	No		✔			
1032	Staff	Pro Dev	Health	No					
1033	M M	Pro Dev	Health	Informally			✔		
1034	Senior S	Pro Dev	IT	Informally		✔	✔		
1035	Staff	R&D	Health	Informally			✔	✔	✔
1036	M M	R&D	E. S. C.	No		✔			
1037	Staff	R&D	IT	No		✔			
1038	Staff	R&D	IT	No		✔			
1039	Senior S	Pro Dev	IT	Informally		✔			
1040	M M	Research	Telecom	Informally			✔	✔	
1041	Staff	Pro Dev	E. S. C.	No		✔			
1042	Staff	Research	Telecom	Formally		✔			
1043	Staff	R&D	IT	Formally		✔	✔		✔
1044	M M	Research	Telecom	Formally		✔			✔
1045	Staff	Research	Telecom	Formally	✔				
1046	Staff	Tech Dev	Telecom	Formally	✔				
1047	Senior S	Research	IT	Formally	✔				
1048	Staff	Pro Dev	E. S. C	No		✔			
1049	Senior S	Research	Telecom	Formally		✔	✔		
1050	Senior S	Research	Telecom	Informally			✔	✔	
1051	Staff	R&D	IT	Informally		✔			
1052	Staff	Pro Dev	IT	Informally		✔			
1053	Senior S	Research	IT	Formally		✔		✔	
1054	M M	R&D	Telecom	Informally			✔	✔	
1055	Staff	Research	E. S. C.	Informally		✔			

Key: Senior S: Senior Staff, **M M**: Middle Manager, **Pro Dev**: Product Development **Tech Dev**: Technology Development **Telecom**: Telecommunication, **E. S. C.**: Electrical and electronic sensors and control systems, **Health**: Healthcare, **IT**: Information Technology. * Interviewees were specifically asked if they are given freedom to pursue their interests. Some answered they are formally allowed to do so, others said it is informally recognized in their organisations. If an interviewee did not specified, the interviewer specifically asked if they have a formal policy to allow them to work on their interests and ideas.

"No, it's not formal. I usually end-up working this way. I am very good about budgeting time… Yes to the nature of the work" (1012, Staff, Product Development)

"Informally y*es, to some extent. My personal experience maybe a little out of the norm because I was in a very unique position in the company. The technical expertise that I brought was rather rare. I had such a relationship with my manager such high level of trust in me that I over the years was very often able to go off and do my own thing… I had a lot of freedom and that freedom was earned. It came because I had demonstrated that I could get things done and I had created ideas."* (1021, Middle Manager, Product Development)

Finally, 21 interviewees said that neither formally nor informally are they given freedom to pursue their interest and ideas. However, 11 of these 21 interviewees specified that they are able to create some sort of freedom to pursue their interest and ideas as result of the nature of their work, for example:

"Because of the nature of my job, considerable amount of time is spent on exploring different options and different solutions… Usually designers and engineers are given a problem or a rough idea about the product and then they are free to explore different options and to choose how to solve it. So the nature of my job gives me freedom to try different things." (1004, Staff, Product Development)

"No we aren't given freedom. It is all matter of how much we can get out of the other projects that are benchmarked, those that customers are paying us money for. We have to benchmark that because we are hourly billing. So if you can find time around that or if you can find something you want to pursue involved

in that you have to do it that way. But it has to be in that framework."   (1014,

Senior Staff, Product Development)

10 of 21 interviewees who claim they are not given any sort of freedom, stated that they

have no freedom to pursue their interest and ideas however they have freedom to decide

how to pursue a given project, the following comments is common among them:

"*There is a lot of freedom to decide how to solve the problem but not for*

pursuing our interests". (1017, Staff, Product Development)

It is important to highlight that having the freedom to pursue their interests and ideas is

not only different from one company to another but also it vary from one department to

another department or even from a group to another group[83].

Consequently, for the majority of interviewees – 33 of them – no matter whether or not

they are allowed to pursue their ideas – the nature of their work can be considered as

the main source of freedom to pursue their interest and ideas. In some organisations this

is understood by the management and these interviewees either informally or informally

are given some freedom. In other organisations, it has been ignored although it does not

mean that people would not create themselves some room to go beyond their

responsibilities to experiment when they think it is required.

By taking a good look at the Table 4.3, it becomes clear that no interviewees from

healthcare industries were formally allowed to pursue their interest and ideas. Even if

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[83] As is highlighted in following comments:

"*There is a fair amount of flexibility. So it has to be aligned with what the company and the*
management wants but you have some flexibility. There has to be technical alignment with the
high level goal. So I don't specifically do 20%. The 20% is just for software engineers not for
our group. But if a project comes up I do spend some time on that." (1043, Staff, R&D)

they are given freedom, it is more informal. Whereas the majority of those who are formally permitted to pursue their interest and ideas are from IT [84] and Telecommunication industries. The three interviewees who are practically allowed to spend a percentage of their time pursuing their interest and ideas are also from IT and telecommunication industries. In the following chapter where the reasons for bootlegging and the decision to reveal the bootleg projects are discussed these elements are highlighted to demonstrate their influence on the interviewees' decisions.

4.6.2. Interviewees' relationship with their management

Since disagreement with management is highlighted as a reason for bootlegging in the literature – for instance by Abetti (1997a, 1999a) – this research investigates interviewees' relationship with their management. As was expected, the interviewees are mainly in touch with their direct manager, so their relationship with their direct manager was mainly examined for this purpose.

It was important to find out what is the interviewees' relationship with their direct manager and whether the direct manager is able to understand the nature of the interviewee's work and whether they can communicate effectively. The interviewees responses to these questions are summarised in Table 4.4. The fifth column of this table shows the quality of their relationship as is described by the interviewees; so it includes great, good and problematic – which is explained in this section. The seventh column shows if there is mutual trust between them. The eighth column shows whether the direct manager of interviewees is able to understand his/her ideas and work. To be able

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[84] Two of the interviewees who are from IT industry are in software companies and they work in product development units. It must be highlighted that these two interviewees work in a quite different environment as they are not given any freedom to pursue their interest and ideas.

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to do so, normally the direct manger and interviewees to some extent should have similar technical background, education and experience. The final element shows if they have previously experienced any problem with their direct manager, as was highlight by four interviewees.

11 interviewees claim to have a great relationship with their direct manager or have a friendship type of relationship. This means there is a strong mutual trust between them, they have similar experience, the direct manager is able to understand technical aspects of interviewees work, and they communication effectively. This is how this group of interviewees normally describe their relationship with their direct manager:

> "*Great. My direct manager is more of a partner and mentor. I consider myself lucky because in some cases his input directly influences the outcome of the project… from the personal side, I would like to consider him as my mentor as well which is kind of good that I have that kind of trust in my manager.*" (1019, Staff, Research)

41 interviewees claimed that they have a good relationship with their direct manager. For these interviewees, they normally have a relationship with their direct manager based on mutual trust – obviously not as strong as the first group mentioned above. Although the direct manager may not have the exact same educational and technical background as the interviewees or not be able to fully understand the work and ideas of the interviewees, at least s/he is able to comprehend the interviewees' work and ideas. For instance, here is a comment that would show the quality of their relationship.

> "*That is fine. For most part I have good relationship with them… Even when my boss thought that it is not going to work, he has faith in my judgment and he lets me work on it*" (1015, Middle Manager, Product Development)

Table 4.4: Interviewees' relationship with their direct manager

Code	Positions	Primary Resp.	Industry	Quality of relationship	Mutual trust	Able to understand work & ideas	Experienced problem
1001	Staff	R&D	Health.	Good	Strong	Yes	Previously
1002	Senior S	R&D	E. S. C.	Good	Strong	To some extent	
1003	M Manager	Pro Dev	IT	Good	Yes	To some extent	
1004	Staff	Pro Dev	E. S. C.	Good	Yes	To some extent	
1005	Staff	Research	Health	Good	Yes	Yes	
1006	M Manager	Pro Dev	E. S. C.	Good	Strong	To some extent	
1007	M Manager	Pro Dev	E. S. C.	Good	Yes	Yes	
1008	Senior S	Tech Dev	Health	Great	Strong	Yes	
1009	M Manager	R&D	E. S. C.	Good	Yes	Yes	
1010	M Manager	Pro Dev	Health	Great	Yes	Yes	
1011	Senior S	Pro Dev	E. S. C.	Great	Strong	Yes	
1012	Staff	Pro Dev	E. S. C.	Good	Yes	To some extent	
1013	Senior S	Pro Dev	Health	Good	Yes	To some extent	Previously
1014	Senior S	Pro Dev	Health	Great	Strong	Yes	
1015	M Manager	Pro Dev	E. S. C.	Good	Yes	To some extent	
1016	Staff	R&D	IT	Good	Yes	Yes	
1017	Staff	Pro Dev	IT	Great	Strong	Yes	
1018	Staff	Research	Telecom	Good	Yes	To some extent	
1019	Staff	Research	IT	Great	Strong	Yes	
1020	Staff	Research	E. S. C.	Good	Yes	Yes	
1021	M Manager	Pro Dev	Health	Good	Strong	To some extent	
1022	Staff	Pro Dev	E. S. C	Problematic	No	No	
1023	Staff	Pro Dev	Telecom	Good	Yes	Yes	
1024	Senior S	Pro Dev	Health	Great	Strong	Yes	
1025	Staff	Pro Dev	E. S. C.	Good	Yes	Yes	
1026	Senior S	Research	Telecom	Good	Yes	Yes	
1027	M Manager	Pro Dev	Health	Problematic	No	No	
1028	Senior S	Research	IT	Good	Yes	Yes	
1029	Staff	Pro Dev	IT	Good	Yes	To some extent	
1030	Staff	Tech Dev	Telecom	Good	Yes	Yes	
1031	Senior S	Research	IT	Good	Yes	Yes	
1032	Staff	Pro Dev	Health	Good	Yes	To some extent	
1033	M Manager	Pro Dev	Health	Good	Yes	Yes	
1034	Senior S	Pro Dev	IT	Great	Strong	Yes	
1035	Staff	R&D	Health	Good	Yes	To some extent	
1036	M Manager	R&D	E. S. C.	Good	Yes	To some extent	
1037	Staff	R&D	IT	Good	Strong	To some extent	
1038	Staff	R&D	IT	Good	Yes	To some extent	
1039	Senior S	Pro Dev	IT	Good	Yes	Yes	
1040	M Manager	Research	Telecom	Good	Yes	To some extent	
1041	Staff	Pro Dev	E. S. C	Problematic	No	No	
1042	Staff	Research	Telecom	Good	Yes	Yes	
1043	Staff	R&D	IT	Good	Yes	Yes	
1044	M Manager	Research	Telecom	Good	Yes	Yes	Previously
1045	Staff	Research	Telecom	Good	Yes	Yes	
1046	Staff	Tech Dev	Telecom	Good	Yes	Yes	
1047	Senior S	Research	IT	Great	Strong	Yes	
1048	Staff	Pro Dev	E. S. C.	Great	Yes	Yes	
1049	Senior S	Research	Telecom	Good	Yes	Yes	Previously
1050	Senior S	Research	Telecom	Good	Yes	Yes	
1051	Staff	R&D	IT	Good	Yes	Yes	
1052	Staff	Pro Dev	IT	Good	Yes	To some extent	
1053	Senior S	Research	IT	Great	Strong	Yes	
1054	M M	R&D	Telecom	Good	Yes	Yes	
1055	Staff	Research	E. S. C.	Good	Yes	Yes	

Key: Senior S: Senior Staff, **M Manager**: Middle Manager, **Pro Dev**: Product Development, **Tech Dev**: Technology Development **Telecom**: Telecommunication, **IT**: Information Technology, **E. S. C.**: Electrical and electronic sensors and control systems, **Health**: Healthcare

There are three interviewees who highlight they often have problem with their direct manager. Normally this type of problem has primarily come up when the interviewee and his/her manager have different backgrounds and they could not understand each

other or communicate properly which makes them not to able to trust each other[85]. For example:

> "*Surprisingly he is a ...*[Specialty of the direct manager] *surgeon, nothing to do with development. He is extremely narrow experienced and extremely political ...with no knowledge. As I told you, I don't have much respect for him... In my view, he doesn't add anything at all to my job, my career or my ability to do the job.*" (1027, Middle Manager, Product Development)

In addition, there are four interviewees who mentioned they were working under different managers that they didn't have a good relationship with and lack of trust and mutual understanding causes some problems that limited undertaking unofficial and informal projects such as bootlegging. The same people under different management were able to pursue bootleg projects. For instance:

> "*Before a year and half ago, I had a supervisor who would not allow me to pursue anything. Even if I pursued something and I told him that I did this, he would have said I don't care. Right now, I have a different situation.*" (1001, Staff, R&D)

> "*My previous manager, I did not fully trust because he did not make every thing transparent. Sometimes he would talk to the business unit without telling us what is going on... we missed a lot of opportunities... But my new manager and I communicate very well and he tells us what is going on...*" (1049, Senior Staff, Research)

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[85] This issue will be discussed in the Chapter 7 where revealing stage of bootleg projects is covered.

4.6.3. Summary of interviewees' circumstances

Of the 55 interviewees 13 interviewees are formally allowed to pursue their interests and their ideas. Only four of the companies have an official strategy to allow employees to spend a percentage of their time pursuing their interests and ideas. In addition, 21 interviewees are informally given freedom to pursue their interests and ideas. On the other hand, there are 21 interviewees who are not given freedom to pursue their interest and ideas. However, 11 of them are able to create some sort of freedom to pursue their interest and ideas as result of the nature of their work. The remaining 10 interviewees have no freedom to pursue their interest and ideas however they have freedom to decide how to pursue a given project.

It was shown that interviewees who work healthcare industry are not formally given freedom to pursue their interest and ideas; whereas normally interviewees from the telecommunication and IT industries – with an exception of software sector – have some sort of freedom to do so.

Another issue that is presented in regard to interviewees' circumstances is their relationship with their direct manager. A great majority of interviewees have great or good relationships with their direct managers which are based on mutual trust and mutual understanding of each other's ideas and work. Only three interviewees expressed that they have a problematic relationship with their direct manager. Besides, four interviewees also mentioned that in the past when they had a different direct manager and they did not have a good relationship with him/her, they would face limitations and pressure, which made it hard for them to bootleg.

4.7. Spectrum of Bootlegging

During the process of data analysis, an initial attempt was made to distinguish different types of bootlegging – true bootlegging, conspiratorial bootlegging and hard-core bootlegging – as defined by Augsdorfer (1996) and explained in Chapter 2. However after coding a few interviews it became clear that the data does not properly fit into these three categories since this research was discovering aspects of bootleg projects that had not been understood by previous researches. Therefore, it was necessary to redefine the different types of bootlegging.

Initially, two primary types of bootlegging – true bootlegging and quasi-bootlegging – are defined. Then, hardcore bootlegging is defined and it will be explained that some true or quasi bootlegging could simultaneously be considered as hardcore bootlegging. This distinction between these two main types of bootlegging is based on the level of management awareness, as is explained in the following points:

- True bootlegging: Bootleg projects pursued by an employee and a few of his/her colleagues. Neither the direct manager of the bootlegger nor the senior management, who are normally the decision makers, are aware of it. It is an unauthorized and clandestine activity.

- Quasi-bootlegging: bootleg projects initiated by an employee which are hidden from the most of organisation. However the bootleggers may discuss them with their direct manager, not to get permission to work on it, but to acquire the manager's opinion or support. It should be noted here that the projects remained completely hidden from senior management and decision makers. So, it is still unauthorised and clandestine and was pursued informally and independently.

While the definition of true bootlegging presented above matches Augsdorfer's (1996) concept of true bootlegging; the quasi-bootlegging as defined is completely different from conspiratorial bootlegging as defined by Augsdorfer. This is mainly because Augsdorfer did not consider the fact that decision makers – who accept or reject R&D projects – could be different from the direct manager of the bootlegger. This research, for the first time, distinguishes these two; so it is able to investigate the influence of each of them separately. Consequently, there is a need to introduce the new concept quasi-bootlegging.

The third type of bootlegging defined by Augsdorfer (1996) is hardcore bootlegging. This type of bootlegging is also observed in our data. However we did not identify it as a group of bootlegging which is mutually exclusive of true bootlegging and quasi-bootlegging, as is done by Augsdorfer. In other word, a true bootleg project or a quasi-bootleg project might be hardcore simultaneously. Besides, the definition of hardcore bootlegging adopted in this paper is wider than that originally presented by Augsdorfer, therefore the definition is:

- Hardcore bootlegging: a bootleg project which has been previously rejected by management or which falls within areas prohibited by the decision makers. Obviously this is also unauthorised and hidden from senior management and decision makers. It might be unknown to the direct manager and then considered as true bootlegging or discussed with the direct manager and considered as quasi-bootlegging as well.

As was discussed in the previous chapter, the interviewees were questioned about the bootleg projects that they have pursued in the last two years. Characteristics of these

bootleg projects are covered in Appendix VI[86]. In addition, as mentioned in previous chapter, interviewees were asked to choose a bootleg projects that they have recently pursued but which they are not currently working on in order to discuss it in detail. The main part of research argument in following chapters is extracted from those projects that are thoroughly studied. Therefore a wide range of aspects of these 55 bootleg projects are discussed and studied for the purpose of this research whose results are presented in the current and following chapters. Specifically, this section covers typologies, closeness to the company business, source of ideas and purpose of these projects.

4.7.1. Typologies of bootleg projects discussed in details

Table 4.5 demonstrates some characteristics of these 55 bootleg projects discussed by the interviewees. Of the 55 projects discussed, three were examples of quasi-bootlegging which means the bootleggers have discussed their project or idea with their direct report at early stages, not to get permission to pursue their ideas but to get their

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[86] One of the first sensitive questions that interviewees were asked was the number of bootleg projects that had been pursued in last two years. Since it was not possible to directly ask this question, they were asked several questions to determine the issue. These questions were also challenging because they were almost the first sensitive question that were asked during the course of interview. Receiving honest answers would demonstrate if the interviewer had been able to gain the interviewee's trust or whether the interview had practically failed. There were also other complications involved at this stage. For instance, to determine the number of bootleg projects, during the pilot study, interviewees were asked apart from formal projects assigned to them, how many project they had pursued informally and independently without managerial knowledge, or at least initiated in this way. Very soon it became clear if the questions focused on ideas that are pursued the number is relatively a large figure. This is because people who work in an R&D environment, because of the nature of their work and responsibilities, normally come up with a number of ideas every month, week or even day. Most of them would be dropped after spending a short period of time working on them or doing research about them. These bootleg projects pursued by interviewees in last two years are covered in Appendix VI.

direct managers' feedback and opinion on the issue. The rest of the 52 projects are considered as true bootlegging since they were hidden from all levels of management at least at the initial stages.

Code	Position	Primary responsibilities	Experience	Industry	Type of bootlegging	Hardcore bootlegging	Closeness to business of company*
1001	Staff	R&D	Less than 10 yrs	Health.	T		Part of official project
1002	Senior Staff	R&D	10 or more yrs	E. S. C.	T		New idea related to their business
1003	M Manager	Pro Dev	20 or more yrs	IT	T	H	New idea related to their business
1004	Staff	Pro Dev	10 or more yrs	E. S. C.	T		Part of official project
1005	Staff	Research	20 or more yrs	Health	T		New idea related to their business
1006	M Manager	Pro Dev	20 or more yrs	E. S. C.	T		New idea related to their business
1007	M Manager	Pro Dev	10 or more yrs	E. S. C.	T		Part of official project
1008	Senior Staff	Tech Dev	20 or more yrs	Health	Q	H	New idea related to their business
1009	M Manager	R&D	10 or more yrs	E. S. C.	T		New idea related to their business
1010	M Manager	Pro Dev	Less than 10 yrs	Health	Q		Part of official project
1011	Senior Staff	Pro Dev	10 or more yrs	E. S. C.	Q		Part of official project
1012	Staff	Pro Dev	20 or more yrs	E. S. C.	T		Working on previous projects
1013	Senior Staff	Pro Dev	20 or more yrs	Health	T		Part of official project
1014	Senior Staff	Pro Dev	20 or more yrs	Health	T	H	Part of official project
1015	M Manager	Pro Dev	10 or more yrs	E. S. C.	T		Working on previous projects
1016	Staff	R&D	20 or more yrs	IT	T		Part of official project
1017	Staff	Pro Dev	Less than 10 yrs	IT	T		Part of official project
1018	Staff	Research	Less than 10 yrs	Telecom	T		New idea related to their business
1019	Staff	Research	Less than 10 yrs	IT	T		Working on previous projects
1020	Staff	Research	20 or more yrs	E. S. C.	T		Working on previous projects
1021	M Manager	Pro Dev	20 or more yrs	Health	T		Part of official project
1022	Staff	Pro Dev	10 or more yrs	E. S. C.	T		Part of official project
1023	Staff	Pro Dev	10 or more yrs	Telecom	T		Part of official project
1024	Senior Staff	Pro Dev	10 or more yrs	Health	T		Working on previous projects
1025	Staff	Pro Dev	Less than 10 yrs	E. S. C.	T		Part of official project
1026	Senior Staff	Research	20 or more yrs	Telecom	T		Part of official project
1027	M Manager	Pro Dev	20 or more yrs	Health	T		Part of official project
1028	Senior Staff	Research	10 or more yrs	IT	T		Working on previous projects
1029	Staff	Pro Dev	Less than 10 yrs	IT	T		Part of official project
1030	Staff	Tech Dev	20 or more yrs	Telecom	T		New idea related to their business
1031	Senior Staff	Research	10 or more yrs	IT	T		Part of official project
1032	Staff	Pro Dev	10 or more yrs	Health	T		Part of official project
1033	M Manager	Pro Dev	10 or more yrs	Health	T	H	New idea related to their business
1034	Senior Staff	Pro Dev	20 or more yrs	IT	T		Working on previous projects
1035	Staff	R&D	Less than 10 yrs	Health	T		Working on previous projects
1036	M Manager	R&D	10 or more yrs	E. S. C.	T	H	New idea related to their business
1037	Staff	R&D	10 or more yrs	IT	T		Part of official project
1038	Staff	R&D	10 or more yrs	IT	T		Working on previous projects
1039	Senior Staff	Pro Dev	20 or more yrs	IT	T		Working on previous projects
1040	M Manager	Research	10 or more yrs	Telecom	T		New idea related to their business
1041	Staff	Pro Dev	10 or more yrs	E. S. C.	T		Part of official project
1042	Staff	Research	10 or more yrs	Telecom	T		Part of official project
1043	Staff	R&D	20 or more yrs	IT	T		Working on previous projects
1044	M Manager	Research	20 or more yrs	Telecom	T		New idea related to their business
1045	Staff	Research	20 or more yrs	Telecom	T		Working on previous projects
1046	Staff	Tech Dev	10 or more yrs	Telecom	T		Working on previous projects
1047	Senior Staff	Research	10 or more yrs	IT	T		Part of official project
1048	Staff	Pro Dev	20 or more yrs	E. S. C.	T		Part of official project
1049	Senior Staff	Research	10 or more yrs	Telecom	T		New idea related to their business
1050	Senior Staff	Research	10 or more yrs	Telecom	T		New idea related to their business
1051	Staff	R&D	Less than 10 yrs	IT	T		Part of official project
1052	Staff	Pro Dev	20 or more yrs	IT	T		Working on previous projects
1053	Senior Staff	Research	10 or more yrs	IT	T		New idea related to their business
1054	M Manager	R&D	20 or more yrs	Telecom	T		Part of official project
1055	Staff	Research	10 or more yrs	E. S. C.	T		Working on previous projects

Table 4.5: Bootleg projects discussed in details (types of bootleg projects)

Key: M Manager: Middle Manager, **Pro Dev**: Product Development, **Tech Dev**: Technology Development **R&D**: Research and Development, **Telecom**: Telecommunication, **E. S. C.**: Electrical and electronic sensors and control systems, **Health**: Healthcare, **IT**: Information Technology, * This is expanded in the next subsection (4.7.2).

Besides, five of 55 projects were hardcore bootlegging (as they are shown in the seven column of Table 4.5). As is shown in the table, the only project that was hardcore quasi-bootlegging was pursued by a senior staff, 1008; the bootlegger's direct manager was involved, hiding it from top management and protecting it from any interruption. As is shown in the table, hardcore bootleg projects were pursued by either middle managers or senior R&D staff.

4.7.2. Bootleg projects closeness to on-going business of company

Bootleg projects can also be categorised according to how close they are to the company's current business, as is shown the last column of Table 4.5. It was mentioned in the literature review chapter (section 2.5) that previous papers claimed that bootlegging might be used to pursue projects that do not match the organisation's on-going businesses. Therefore, the researcher was curious to find bootleg projects that are far from the company's business. Such projects were not found in our research and all the bootleg projects discussed by the interviewees are related to the companies' on-going business in one way or another. Since, as has been previously mentioned, most of these companies use stage-gate processes it was also important to see at what stage of the stage-gate process these bootleg projects occur.

4.7.2.1. Part of official projects

As is clear from Table 4.5, 25 bootleg projects were primarily initiated in order to pursue an official project differently – through underground process – mainly because they could see some benefit in doing them differently but were unable to convince decision makers at that stage. Thus they may be considered as part of official projects and very much related to the organisation business, for example:

"Once I heard about their problem, it was suddenly clear how to solve it… It was something that they brought me to their meeting and said here is the problem. Can we do something to solve this? … Just going to the direction that I wanted to go was not their idea … I describe it as an unofficial project because I was pulled in to do something different than what I wanted to do. They wanted to develop … [Special type of] *sensor and I wanted to develop an optical system for sensing..."* (1014, Senior Staff, Product Development)

Considering Cooper's (1990) model, these 25 projects occur at different stages of stage-gate process; from preliminary assessment to testing and validation. For instance, the project discussed by interviewee 1014 mentioned above was at the preliminary assessment stage when the interviewee came up with the idea to develop a different sensor; whereas for interviewee 1001, for instance, bootleg projects began in the testing and validation stage ending up not only improve the product but also modifying the testing and validation process for a particular product. She mentioned:

"I was doing some correction to … [a product] *that was developed last year. We already had the method and I just specified that to …*[the product]*. But the method we had was very slow which made …*[the product] *slow. Then I remember the method I used during my PhD. It was an optimization method and I realized that I can apply it to this problem ..."* (1001, Staff, R&D)

4.7.2.2. Working on previous projects

Table 4.5 also illustrates that 15 bootleg projects were primarily set to go back to the previous projects either in order to improve an existing product of the organisation or to retrieve a failed project in the hope of succeeding, for instance:

"It was following a work that we abandoned a few years ago. Mainly because we didn't have any application for it at the time. Initially we had a patent and this work was following that. I've seen a problem with ... [their system]*... I tried to overcome this problem."* (1031, Senior Staff, Research)

"It was an idea to propose it to one of our main customers. An alternative to the product that they were buying. This product that can be used for certain surgeries..." (1035, Staff, R&D)

It is clear from the above comments that for some of these bootleg projects it cannot be specified at what stage of the stage-gate process they occur. This is because they go back to developed abandoned projects such as the one discussed by interviewee 1031, as is clear from the quote above. On the other hand, there are some of these projects that target products that are already in full production and even sold to customers, as is clear from interviewee 1035's comment above.

4.7.2.3. New ideas related to their business

Finally, 15 bootleg projects were initiated to work on new projects which are also related to the company business, for instance to develop a new technology or to incorporate a new technology. Two of these 15 projects – one pursued by a senior researcher and another one by a middle manager – were quite different from normal projects, they were still related to their business. Following are some common comments among this group:

"It wasn't in our main core business. It was related to our business." (1018, Staff, Research)

"This was directly related to what we do. It could be a product but just as far as the type of product but we were not developing it for anybody. That would be

new product and the intellectual property would help us to attract other

customers to ... to sell it to them." (1033, Middle Manager, Product

Development)

Only this group of bootleg projects can be considered as projects that occur in the first

stage of the stage-gate process as described by Cooper (1990). What is really interesting

is that bootleg projects – especially those presented to the decision makers after being

prototype or even later (will be discussed in Chapters Seven) – would circumvent gates

as long as they remain underground.

4.7.3. Source of the bootleg projects' ideas

Another issue that is considered in regard to these projects is the source of the idea and

the purpose of them. Table 4.6 shows these characteristics of 55 projects discussed in

details with interviewees. While the existing literature suggests that bootleggers aim for

product innovation, the findings here show that this is not necessarily true. Four of the

projects discussed by interviewees had the primary aim of improving an organisational

process rather than modifying or creating a new product. These ranged from refining a

part of the R&D process, adding a feature to a product that helps customer service and

onsite engineers, developing a tool that can be used by different departments in the

organisation, to ways of saving significant time on the production line. For instance an

interviewee mentioned:

"*in our manufacturing facility we make millions of* …[a product] *a year so it is*

a very high volume operation. We had in manufacturing an equipment that was

used to measure every …[aspect of the product] *that was made. Because I was*

working closely with manufacturing colleagues, I knew about this problem.

There were accuracy issues, yield issues and there were ... [technical] *issues. So*

as an engineer who is always looking to solve a problem, I came up with a very

bold sort of concept." (1021, Middle Manager, Product Development)

Table 4.6: Bootleg projects discussed in details (source of idea and purpose of projects)						
Code	Position	Primary responsibilities	Type of bootlegging	Closeness to the company business	Source of the idea	Ultimate purpose of the projects
1001	Staff	R&D	T	1	Experience and knowledge	Accelerate an R&D process
1002	S S	R&D	T	3	Exhibition	Create a new product
1003	M M	Pro Dev	T & H	3	Experience and knowledge	Apply a new technology
1004	Staff	Pro Dev	T	1	Watch customers using product	Refine their product
1005	Staff	Research	T	3	Reading literature	Develop a technology
1006	M M	Pro Dev	T	3	Customer request	Creating a new product
1007	M M	Pro Dev	T	1	Experience and knowledge	Complete an existing product
1008	S S	Tech Dev	Q & H	3	Seeing market opportunity	Develop a new technology, new product
1009	M M	R&D	T	3	Experience and knowledge	Modify a product to find a new use for it
1010	M M	Pro Dev	Q	1	Customer's feedback	Improve their product
1011	S S	Pro Dev	Q	1	Problem reported by customers	Refine their product
1012	Staff	Pro Dev	T	2	Customer service difficulties	Add a feature to their product
1013	S S	Pro Dev	T	1	Experience and knowledge	Improve their product
1014	S S	Pro Dev	T & H	1	Experience and knowledge	See a problem in official project
1015	M M	Pro Dev	T	2	Experience and knowledge	Apply a method to improve their product
1016	Staff	R&D	T	1	Experience and knowledge	Apply a new technology
1017	Staff	Pro Dev	T	1	Experience and knowledge	Change a feature of a product
1018	Staff	Research	T	3	Experiment and experience	Improve available technology
1019	Staff	Research	T	2	Interact with customers	Improve their product
1020	Staff	Research	T	2	Found a solution	Developed a dropped project
1021	M M	Pro Dev	T	1	Interact with production	Improve production process
1022	Staff	Pro Dev	T	1	Interact with marketing	Refine the major customer's product
1023	Staff	Pro Dev	T	1	Experiment and experience	Change a feature of their product
1024	S S	Pro Dev	T	2	Experiment and experience	Apply a new method
1025	Staff	Pro Dev	T	1	Experience and knowledge	Improve underdeveloped product
1026	S S	Research	T	1	Experience and knowledge	Add a feature to underdevelopment product
1027	M M	Pro Dev	T	1	Brainstorming session	Try a new approach
1028	S S	Research	T	2	Experience and knowledge	New application for developed product
1029	Staff	Pro Dev	T	1	Experience and knowledge	Add a feature to their product
1030	Staff	Tech Dev	T	3	Experience and knowledge	Facilitate a process in their organisation
1031	S S	Research	T	1	Conference and paper	Application for developed technology
1032	Staff	Pro Dev	T	1	Experience and knowledge	Reduce concerns about a project
1033	M M	Pro Dev	T & H	3	Interact with customers	Develop a new product
1034	S S	Pro Dev	T	2	Experience and knowledge	Improve a developed process
1035	Staff	R&D	T	2	Experience and knowledge	Modify a developed product
1036	M M	R&D	T & H	3	See the market opportunity	Apply a developed technology
1037	Staff	R&D	T	1	Experiment and experience	Avoid the understood problem in official project
1038	Staff	R&D	T	2	Experiment and experience	Adding a feature to developed product
1039	S S	Pro Dev	T	2	Experiment and experience	Remove a significant limitation of their product
1040	M M	Research	T	3	Conference	Develop a new technology
1041	Staff	Pro Dev	T	1	Experiment and experience	Improve underdeveloped project
1042	Staff	Research	T	1	Experience and knowledge	Apply a different method
1043	Staff	R&D	T	2	Experience and knowledge	Improve previously developed product
1044	M M	Research	T	3	Experiment and experience	Develop a new technology
1045	Staff	Research	T	2	Experience and knowledge	Improve previously developed system
1046	Staff	Tech Dev	T	2	Experience and knowledge	Apply a technology to improve their product
1047	S S	Research	T	1	Experience and knowledge	See the risk of official project
1048	Staff	Pro Dev	T	1	Experience and knowledge	Apply a technology in official project
1049	S S	Research	T	3	Conference and paper	Advance their technology
1050	S S	Research	T	3	Experience and knowledge	Advance their technology
1051	Staff	R&D	T	1	Interacting with production	Improve their product
1052	Staff	Pro Dev	T	2	Experience and knowledge	Improve their product
1053	S S	Research	T	3	Experience and knowledge	Develop new technology
1054	M M	R&D	T	1	Experiment and experience	Improve their product
1055	Staff	Research	T	2	Conference	Improve their technology

Key: **S S**: Senior Staff,   **M M**: Middle Manager,   **Pro Dev**: Product Development,   **Tech Dev**: Technology Development
R&D: Research and Development   **T**: True-bootlegging,   **Q**: Quasi-bootlegging,   **H**: Hardcore bootlegging
*1: Part of official project   **2**: Work on previous project   **3**: New Idea with in organisation business

Sources of the ideas and how interviewees came up with ideas pursued underground is also another issue discussed with interviewees. As is shown in the sixth column of the Table 4.6, the idea emerges in a number of different ways. For 26 interviewees, it was as a result of their knowledge and experience that they come up with the idea, for instance:

> "*...It was based on my previous work experience in another medical device company where we developed a lot of single use products.*" (1035, Staff, R&D)

For the rest of interviewees, there were additional elements that are added to their knowledge and experience and result in the emerging of a new idea. This does not mean that the experience and knowledge of interviewees play no role in emergence of these ideas. For instance, for nine interviewees a combination their knowledge, experience and the experiment that they were engaged in resulted in the emergence of their ideas. For four interviewees, interacting with people within the organisation such as attending a brainstorming session, working closely with production people, seeing the customer service and on site engineers problems, or communication with marketing can also be considered as the sources of ideas[87].

For another four interviewees attending conferences, listening and talking with other scientists triggered the emergence of the idea for their bootleg project[88]; whereas for another interviewee when he was visiting a fair he saw a product developed by a competitor and he was able to pin down the problem with it and then decide to make the

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[87] "*We were discussing this and we were brainstorming and I said well why don't we try this approach… That was the initiative.*" (1027, Middle Manager, Product Development)

[88] "*In a conference like this I see what is coming and what people might need. And then I try to think about an elegant solution and then maybe I model it and see if it works*" (1055, Senior Staff, Research)

correct version for their organisation[89]. For three interviewees, reading papers and other people's work that they pursued helped them to develop an idea to benefit the organisation, this is then developed through bootlegging channels.

Another source for ideas pursued via bootlegging is interaction with customers, such as direct communication between them and customers or watching a customer use their product, getting customers' feedback or receiving a push from a customer to get a new product. Although it is only discussed by six interviewees as the main source of their ideas, there is significance to it. This shows that in addition to the technology-push type of projects pursued by the bootleggers, market-pull type of projects may also be pursued via bootlegging channel.

It can also be inferred from the literature, especially Augsdorfer's (1996, 2005, 2008) and Abetti's (1997a, 1997b, 1999a, 1999b) papers, that bootleg projects are technology driven. However, this research found that not all bootleg projects are technology driven. 45 out of 55 projects discussed in detail are technology driven, whereas the initial inspiration for 10 projects came from direct or indirect contact with market players including customers and competitors. Interestingly this type of bootleg project is mostly pursued by interviewees who focus on product development rather than on other responsibilities. The following comments explain the initiation of these projects.

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[89] "*I would say that probably, a large part of it, was from going a trade show. At trade shows, I would be able to see there are some opportunity gaps just from watching products and how they work. So if we go to other people booths and try to see what products they are offering and try to see if there are any holes or opportunities there ...*" (1002, Senior Staff, R&D)

"It was a small start up company that came to us looking for …[specific product] for treatment operations, pretty far from what we had done before..."(1006, Middle Manager, Product Development)

"… after several discussions that I had with marketing representatives while we were trying to develop ... for a major customer. We all saw that problem and after a while I came up with a way to address this problem and …"(1022, Staff, Product Development)

4.7.4. Summary of spectrum of bootlegging

At the beginning of this section, three concepts were redefined, true bootlegging, quasi bootlegging and hardcore bootlegging since it was necessary to have clear definitions that would explain some of the issues that will be raised in the next chapter. As was also mentioned, interviewees were questioned about the bootleg projects they have pursued in last two years – discussed in appendix VI – and they were also asked to discuss one bootleg project in detail.

Of the 55 bootleg projects discussed in detail, three were quasi-bootlegging and 52 were true bootlegging. In addition, five of them can be considered as hardcore bootlegging. Besides, 25 of 55 are part of on-going official projects that interviewees wanted to pursue differently, thus they decided to pursue them underground. This type of bootleg projects occurred at different stages of the stage-gate process. There are also 15 bootleg projects that are set to go back to refine previously developed products or retrieve previously failed projects. Those bootleg projects that target previously developed products occurred when the product is at production or has been sold to customers, thus they occurred at the final stage of the stage-gate process described by Cooper (1990). Lastly, there are 15 bootleg projects which are based on new ideas but related to the

organisation business. This group of bootleg projects occur at the fist stage of the stage-gate process, however they often circumvent some stages and gates.

To understand what type of ideas and projects are normally pursued underground, the beginnings of these bootleg projects, specially the source of the primary idea for these projects were also discussed. Interestingly, in contrast to previous papers, this research found bootleg projects that primarily focus on a process in the organisation in addition to those that focus on products. This research also found that bootleg projects are not necessarily technology driven. Some of these bootleg projects were initiated to address customers' market needs.

4.8. Chapter Summary

The research findings presented in this chapter are clustered around four major issues. First, they cover interviewees' characteristics. Second, they try to explain the environment that interviewees work in including their industries, organisations, units and groups; as environments in which bootleggers operate. Third, they describe interviewees' works, responsibilities, and circumstances. Finally, they demonstrate the spectrum and characteristics of bootleg projects.

4.8.1. Interviewees characteristics

Interviewees are mainly men in their 30 to 50s. They are experienced and highly educated (at least having a bachelor degree, mainly having a master, or a PhD or equivalent). They are technologically enthusiastic engineers and scientists who are considered to be creative and innovative people in their organisation.

4.8.2. Environmental issues

All interviewees come from healthcare (pharmaceutical and medical devices), electrical and electronic sensors and control systems, information technology, and telecommunication. It seems that rules and regulation in healthcare industries limit the possibility of unofficial processes for developing products. Whereas interviewees who work in IT and telecommunication system benefit from having more freedom and opportunity for bootlegging. This does not necessarily mean the higher number of bootleg projects are pursued by those who work in IT or telecommunication system industries in comparison to those who work in healthcare industry.

The majority of interviewees come from American corporations or the American branch of their company. In addition, the interviewees mainly work in large corporations which are public companies. There are few interviewees who come from middle size organisations that are privately owned. This research did not find any difference in bootleg projects pursued by interviewees who come from different countries and different size organisations. Besides, no significant difference in bootleg projects pursued in different size R&D departments or different size groups were found.

Interviewees work in organisation with three to five levels of management and the important decisions in regard to R&D activities such as approving or rejecting a projects, allocating funds, etc. are made by a senior manager or a group including senior management. Therefore not only do the interviewees have no influence on this type of decision but also their direct managers either have no influence or they are just a member of the group that make these decisions.

In terms of the type of projects pursued in interviewees' units, some interviewees come from units in which projects are defined by marketing departments, then there are interviewees whose units focus on research and technology development, here most of the projects are technology oriented. There are also interviewees who work in units that follow both types of projects mentioned above. The availability of an idea submission system was also considered. In the majority of cases interviewees either do not have an efficient and practical idea submission system or if they have one, they prefer not to use it.

In terms of interviewees' access to resources, specially financial resources, it was shown that interviewees' budgets are normally planned periodically and then they are allocated to official projects. There are interviewees who have slack resources and

funding such as a "*blue sky fund*". Even these interviewees do not normally have direct access to these resources and they need to ask for these resources from management.

4.8.3. Interviewees' work, responsibilities and circumstances

Interviewees include normal staff, senior staff and middle managers who work in research, technology development, research and development, and product development units. Their responsibilities are mainly to pursue research projects, develop technology or products, or a mixture of these. Interviewees also have other responsibilities such as attending meetings, preparing reports and documents, attending conferences, etc. They are engaged in more than one project at one time and they are in charge of prioritizing their time on a daily basis. The interviewees are in charge of managing their time among different projects and responsibilities which gives them a degree of flexibility in terms of how they spend their working hours and therefore they are able to bootleg. Those who have managerial roles but are in charge of few people would also be able to make their staff to work on their official or bootleg projects.

Of the 55 interviewees, 35 are either formally or informally given freedom to work on what they think necessary; only four exceptions can spend a percentage of their time working on their own interests and ideas. Another 11 interviewees, although they are not given freedom, are able create some room for themselves to pursue their interests and ideas because of the nature of their work.

In general, interviewees have a good relationship with their direct manager. This seems to be an important issue for bootleggers as those who have experienced problematic relationship with their direct manager in the past specified that they did not use to bootleg; however now under different management where they have a good relationship, they can bootleg. Lack of mutual understanding between the interviewees

and their direct managers negatively influences their communication and trust; therefore it makes challenges for bootlegging which will be discussed in Chapter 7.

4.8.4. Bootleg projects

Finally, 55 bootleg projects were thoroughly discussed by the interviewees. These included three quasi-bootlegging and 52 true bootlegging[90]. Among them, five were identified as hardcore bootlegging. In addition, as is presented in Appendix VI, 224 bootleg projects that are pursued by interviewees in last two years include 197 true bootleg projects and 27 quasi-bootleg projects; of all the projects undertaken 29 are considered to be hardcore bootlegging..

All of these projects are considered to be highly related to the organisation business. Some are new ideas related to the companies mainstream business, some retrieve previous projects and others try to complete a part of an official project underground. Thus, bootlegging occurs at different stages of the stage-gate process described by Cooper (1990). Bootleggers may go back through the stage-gate process by working on a project that is in final stages of the stage-gate process or retrieve a previously killed project.

None of them – even those that are considered to be hardcore bootlegging – were in conflict with the organisations strategy and was totally unrelated to their organisation's

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[90] This is explained in Chapter 3 that interviewees were questioned about bootleg projects they have pursued in last two years. The research investigated types of these projects which are presented in Appendix VI. In addition, interviewees were asked to discuss one bootleg project in detail; Section 4.7 focused on these 55 bootleg projects that were thoroughly discussed with interviewees. Interestingly, the findings on type of 224 bootleg projects pursued by interviewees in last two year (presented in Appendix VI) confirms the findings on 55 thoroughly discussed bootleg projects in detail (presented in Section 4.7).

business. This is in line with Augosdorfer's (1996, 2008) finding, however it contradicts the claim by Ma (2002) and Roussel *et al.* (1991) that bootlegging challenges an organisation's strategy.

The initial ideas behind these projects were also shown to have arisen by very different routes. Although the idea generator's knowledge and experience play a critical role, ideas may also emerge from attending a conference or trade show, reading other people's works or listening to scientists' talks, observing or communicating with customers, interacting with marketing or production, etc. Thus both market pull and technology push types of projects are observed by this research.

CHAPTER 5:

DECISION TO BOOTLEG

5.1. Introduction

This whole purpose of this chapter is to answer the first research question: Why do employees choose to bootleg? In order to answer this question this chapter discusses several issues. First, it describes what happens when interviewees come up with a new idea by discussing the early steps they normally undertake when they come up with a new idea. Second, it discusses reasons proffered by interviewees for bootlegging and not approaching the decision makers to get official approval to pursue their interest and ideas.

To answer the research question thoroughly, it is also important to see what their motivation for bootlegging is. This research also considers interviewees' concerns and criteria for developing a project underground. Finally, a summary of the issues raised in this section is presented which includes a framework explaining elements that influence interviewees' decisions to bootleg.

5.1.1. Layout of this chapter

First, this chapter (in section 5.2) covers what interviewees normally do when they come up with a new idea. It clearly shows the challenges that interviewees face when they have a new idea that can potentially benefit their organisations. Then, section 5.3 discusses the reasons given by the interviewees for initiating bootleg projects rather than approaching decision makers to acquire official permission to pursue their projects. The fourth section (5.4) presents motivations for bootlegging which include the benefits of bootleg projects for organisations and personal benefits of bootleg projects. The chapter continues, in section 5.5, with detailed discussion on interviewees' considerations about to pursuing their ideas underground which highlights elements that influence their

decision to pursue particular projects underground. The last section (5.6) concludes this

chapter by answering the first research question and presenting a framework that clearly

explains how interviewees decide to bootleg.

5.2. First Step After An Idea Emerges

Prior to discussing the bootleg projects, it is important to understand the early steps that interviewees normally take when they come up with a new idea relevant to their work. Primarily, this research tries to find out if the interviewees approach their decision makers to seek official approval when they come up with a new idea. If this is not the first step, what do they do prior to approaching decision makers to get official approval for their projects?

The first significant observation is that normally approaching decision makers to seek official approval to pursue the idea is not the first step. Interviewees would usually undertake at least few steps prior to approach their decision makers. This is mainly because they have to take other steps before approaching decision makers. The following comment is common among the interviewees:

> "*No. That is not the best way to do what you think is right to do. Because you never get management approval for raw ideas.*" (1037, Staff, R&D)

Table 5.1 illustrates first steps taken by each interviewee after s/he comes up with a new idea. As is shown in this table, for most of the interviewees there are a number of actions that they undertake once they come up with a new idea before approaching decision makers or officially submitting their idea. These actions – which may be taken either simultaneously or sequentially – are thoroughly explained in following subsections.

						Approach colleagues					
Code	Position	Primary responsibility	Industry	Read, research & collect data,	Do sketch, run test & simulation	Approach direct manager	Approach R&D fellows	Approach marketing and sales staff	Approach Customers	Document the idea	Submit the idea or seek official approval
1001	S	R&D	Health.	✓	✓						
1002	S S	R&D	E. S. C.				✓				
1003	M M	Pro Dev	IT	✓							
1004	S	Pro Dev	E. S. C.				✓				
1005	S	Research	Health	✓			✓				
1006	M M	Pro Dev	E. S. C.				✓				
1007	M M	Pro Dev	E. S. C.				✓				
1008	S S	Tech Dev	Health	✓		✓	✓				
1009	M M	R&D	E. S. C.		✓		✓				
1010	M M	Pro Dev	Health		✓	✓	✓	✓			
1011	S S	Pro Dev	E. S. C.		✓	✓					
1012	S	Pro Dev	E. S. C.		✓		✓				
1013	S S	Pro Dev	Health	✓			✓	✓			✓
1014	S S	Pro Dev	Health	✓	✓					✓	
1015	M M	Pro Dev	E. S. C.		✓						
1016	S	R&D	IT		✓						
1017	S	Pro Dev	IT	✓	✓	✓					
1018	S	Research	Telecom		✓						
1019	S	Research	IT			✓	✓				
1020	S	Research	E. S. C.		✓		✓	✓	✓		
1021	M M	Pro Dev	Health				✓	✓			
1022	S	Pro Dev	E. S. C.				✓				
1023	S	Pro Dev	Telecom	✓							
1024	S S	Pro Dev	Health	✓	✓	✓	✓				
1025	S	Pro Dev	E. S. C.				✓				
1026	S S	Research	Telecom	✓	✓						
1027	M M	Pro Dev	Health	✓			✓				
1028	S S	Research	IT		✓						
1029	S	Pro Dev	IT		✓						
1030	S	Tech Dev	Telecom	✓			✓				
1031	S S	Research	IT	✓			✓				
1032	S	Pro Dev	Health		✓						
1033	M M	Pro Dev	Health		✓				✓		
1034	S S	Pro Dev	IT				✓				
1035	S	R&D	Health		✓						✓
1036	M M	R&D	E. S. C.		✓						
1037	S	R&D	IT		✓		✓				
1038	S	R&D	IT		✓						
1039	S S	Pro Dev	IT		✓						
1040	M M	Research	Telecom		✓	✓					
1041	S	Pro Dev	E. S. C.		✓						
1042	S	Research	Telecom							✓	
1043	S	R&D	IT	✓							
1044	M M	Research	Telecom		✓		✓				
1045	S	Research	Telecom	✓			✓				
1046	S	Tech Dev	Telecom				✓				
1047	S S	Research	IT	✓	✓		✓				
1048	S	Pro Dev	E. S. C.		✓	✓					
1049	S S	Research	Telecom		✓		✓				
1050	S S	Research	Telecom	✓	✓		✓				
1051	S	R&D	IT	✓	✓						
1052	S	Pro Dev	IT				✓	✓			
1053	S S	Research	IT		✓		✓				
1054	M M	R&D	Telecom	✓						✓	
1055	S	Research	E. S. C.	✓	✓		✓				

Key: S: Staff; **S S:** Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **R&D**: Research and Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

5.2.1. Read, research and collect data

Of 55 interviewees, 20 mentioned that they need to spend some time think about the idea, read some materials, search for further information and gather some data and do some pre-research activities. Only four interviewees would merely undertake such action, the rest of interviewees who need to do so, would do that simultaneously or sequentially with other actions, for example:

"*In general, we would try to work on the idea. I might visit a colleague. I might talk or sit and think about it. I might try to write some summary of it and see what other people have done in terms of research*" (1005, Staff, Research)

"*The first step was gather information to see whether this idea is worth doing. I also talked to one of the scientist in our group that is expert in this area… No it's too soon to discuss it with management.*" (1024, Senior Staff, Healthcare)

5.2.2. Do sketches and run test and simulation

Another step undertaken by 32 interviewees when they come up with a new idea is to run a test or simulation and do some sketches to find out the value of the idea. This step is normally taken simultaneously with other actions such as talking to colleagues, etc. The following comments are common among these interviewees:

"*There is no way but to work on them on my own. Just work on it and some how try to test them even though it is not easy. But the primary data is essential for internal ideas to get the approval.*" (1028, Senior Staff, IT)

"*Well depending on the idea… Usually there is a concept and you think it may have some values and so I do may be some paper studies or talk to some people. If it continues to look good I'll either do it myself or have someone do some*

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simulation. And from those simulations concept I'll pursue opportunities to experimentally demonstrate it." (1047, Senior Staff, Research)

5.2.3. Approach colleagues in the organisation

As is clear from the comments above, in addition to working on the idea in order to develop it, several interviewees approached people inside their organisations to get their feedback and comments on their ideas and projects as the first steps. These insiders who are approached by the interviewees include interviewees' direct managers; fellow researchers, scientists and engineers in their department, and often marketing experts. This can be considered as another initial step undertaken by interviewees when they come up with a new idea:

- Approaching the direct manager: Of those who approach their direct manager, they would not do it to gain official permission to work on their ideas. They approach their managers to get their feedback and comments on the idea and discuss whether this is the time to present the idea formally. As interviewees mentioned:

  "*It depends, sometimes I come up with the idea just in theoretical terms and bring the idea up and see what ...* [my managers] *might be thinking about it before I do anything with the idea. There other times that I implemented the idea and tested it out first and then discuss the merits of it with ...* [my managers]." (1011, Senior Staff, Product Development)

- Approaching other colleagues: Another group of insiders which are widely consulted when an interviewee has an idea is his/her fellow R&D staff – e.g. research, technology development, R&D and product development staff or senior staff. 30 interviewees highlighted that they would do so to get their colleagues' insights on the idea, as can be seen in the following comments.

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"So the first step is obviously to make sure that the idea's kind of worthwhile from …[the company] perspective. If it is shown that the idea will benefit … [the company] then I start to talk to engineers and get their feedback and see where it is going to go." (1034, Senior Staff, Product Development)

- Approaching marketing and sales staff: There are also six interviewees who mentioned they might approach their colleagues in the marketing or sales department to get their feedback on their ideas and to assess the value of their ideas from a marketing perspective. Thus marketing experts in the organisations are another group of insiders who are consulted as the first step when an idea emerges.

"If we have an idea for a new product, we would involve the other groups and primarily we have to involve marketing. In reality all the companies should be market driven, which means you have to understand the market and you have to access the need and you have to provide a solution that actually meets an existing need…" (1021, Middle Manager, Product Development)

5.2.4. Approach customers

There are also two interviewees who mentioned, in addition to the steps discussed above, that they might approach customers to get their feedback and understand their needs in order to show the value – from a marketing perspective – of their idea for their organisation. They mentioned:

"You work it out, craft more details and put some flesh on the bones and make a convincing market case for it or maybe others talk to customers to see if this is what they want and …" (1033, Middle Manager, Product Development)

5.2.5. Document the idea

Two interviewees mentioned they need to document their ideas when they come up with an idea in their lab documentations. This doesn't mean that they officially submit their ideas. They only record them but if they are interested they would work on them informally without getting official approval and even hide them from their management, for example:

"*Well the first step is to document it and date it in the laboratory notebook or something like that. Then more formally document it when it is ready to be evaluated. Just documenting it in the laboratory notebook won't make it a formal project… But it needs to go through a more formal process when it's sufficiently developed*" (1042, Staff, Research)

As is clear from the above comment, even these interviewees would undertake some actions before presenting their emerging ideas to the decision makers.

5.2.6. Submit the idea or seek official approval

Table 5.1 also shows that two other interviewees claimed that, in general, they might seek official approval when they come up with new ideas. For these two interviewees – 1013 and 1035, both from the healthcare industry – if the idea or the project that they have in mind required significant amounts of time or resources to develop they would prefer to approach decision makers to acquire permission to work on the idea, for example:

"*Nothing physical, it is just all in paper. It is like an unmet need that I have an idea how to solve it. I just write down on the paper what the need is. It is like you see something in a surgery or cadaver lab and you come up with an idea. At that*

point, I am not allowed to put a lot of time into to develop it. I would see if it's

been patented already which is good in a way because that's a part of the

process that they have approved upon. It normally takes many hours for an

engineer to submit their ideas." (1013, Senior Staff, Product Development)

There are two further issues that need to be highlighted. First, even these two interviewees admitted that in some cases they would informally try to do some work to raise their chance for getting official approval. The interviewee 1013 mentioned that it takes them some time to propose their ideas because they have to prepare them to be presented. The other interviewee – 1035 – states that if he can develop the idea with his limited time and resources, he would go as far as making a prototype to raise the chance of getting approval. He would only submit his ideas right after they emerged when they are too time and resources consuming so that he is not able to develop them informally. Interestingly, even these two interviewees mentioned, in the particular projects that they choose to discuss in details, submitting their ideas is not their first step.

"*My first reaction was to ask …* [the person who was in contact with customer] *if*

he could get a brief feedback from the customer, if they are interested in such

projects. First, I wanted to know if my idea is worth going and getting permission

for. If … [the person who was in contact with customer] *who is the direct link to*

the customer had told me that it was not worth pursuing it… then I wouldn't

spend time on it and then I would submit it" (1035, Staff, R&D)

5.2.7. Summary of first steps after an idea emerges

Thus, all 55 interviewees admitted that approaching management to get official approval is not their first step when they come up with a new idea. Instead, they start the ground work on their own initiatives; for instance, searching for information, reading previous

work and relevant literature, running tests and simulations, doing some sketches, talking

to the direct manager, colleagues and customers. This does not mean, however, that

every time they come up with a new idea they start to bootleg.

5.3. Reasons for Bootlegging

The previous section clarifies that getting official approval for pursuing the project is not the interviewees' first step, because the chance of getting official approval at this stage is normally very slim. This section looks into the reasons highlighted by the interviewees for pursuing the chosen bootleg projects underground rather than presenting the idea to the decision maker after taking first steps discussed above. Table 5.2 summarises the answers given by the interviewees for bootlegging. This section discusses reasons for bootlegging presented in Table 5.2.

5.3.1. Need to show feasibility or proof of concept

First of all, 14 interviewees said that when they presented their idea to the decision makers, they would be asked to present some data to support their idea (show the proof of concept, or demonstrate its feasibility) and consequently they had to carry out bootlegging. This reasons seem to be more common among those who focus on product development rather than those who in research or technology development units. This is not limited to the technical data such as proof of technology. They are often asked to present marketing data or data that shows the potential financial benefits of the idea for the company.

> "*Because initially we needed to generate some data to give an idea that this was at least feasible…*" (1027, Middle Manager, Product Development)

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Table 5.2: Reasons for bootlegging

Code	Position	Primary responsibility	Industry	Type of bootlegging	Need to show feasibility or proof of concept	Decision makers can't understand the idea	Having an immature idea	Pre-research	Showing the market demand	Avoiding physiological pressure
1001	S	R&D	Health.	T		✓		✓		
1002	S S	R&D	E. S. C.	T	✓					
1003	M M	Pro Dev	IT	T & H		✓				
1004	S	Pro Dev	E. S. C.	T				✓		
1005	S	Research	Health	T	✓					
1006	M M	Pro Dev	E. S. C.	T	✓					
1007	M M	Pro Dev	E. S. C.	T	✓					
1008	S S	Tech Dev	Health	Q & H		✓	✓			
1009	M M	R&D	E. S. C.	T	✓					✓
1010	M M	Pro Dev	Health	Q	✓					
1011	S S	Pro Dev	E. S. C.	Q				✓		
1012	S	Pro Dev	E. S. C.	T				✓		
1013	S S	Pro Dev	Health	T		✓				
1014	S S	Pro Dev	Health	T & H		✓				
1015	M M	Pro Dev	E. S. C.	T		✓				
1016	S	R&D	IT	T			✓			
1017	S	Pro Dev	IT	T	✓					
1018	S	Research	Telecom	T				✓		
1019	S	Research	IT	T		✓				
1020	S	Research	E. S. C.	T				✓		
1021	M M	Pro Dev	Health	T	✓	✓				
1022	S	Pro Dev	E. S. C.	T		✓				
1023	S	Pro Dev	Telecom	T			✓			
1024	S S	Pro Dev	Health	T				✓		
1025	S	Pro Dev	E. S. C.	T				✓		
1026	S S	Research	Telecom	T			✓			
1027	M M	Pro Dev	Health	T	✓					
1028	S S	Research	IT	T			✓			
1029	S	Pro Dev	IT	T			✓			
1030	S	Tech Dev	Telecom	T				✓		
1031	S S	Research	IT	T		✓				
1032	S	Pro Dev	Health	T				✓		
1033	M M	Pro Dev	Health	T & H	✓	✓				
1034	S S	Pro Dev	IT	T				✓		
1035	S	R&D	Health	T			✓			
1036	M M	R&D	E. S. C.	T & H		✓				
1037	S	R&D	IT	T			✓			
1038	S	R&D	IT	T	✓					
1039	S S	Pro Dev	IT	T	✓	✓				
1040	M M	Research	Telecom	T		✓				
1041	S	Pro Dev	E. S. C.	T	✓					
1042	S	Research	Telecom	T				✓		
1043	S	R&D	IT	T	✓					
1044	M M	Research	Telecom	T			✓			
1045	S	Research	Telecom	T						✓
1046	S	Tech Dev	Telecom	T			✓		✓	
1047	S S	Research	IT	T			✓		✓	
1048	S	Pro Dev	E. S. C.	T				✓		
1049	S S	Research	Telecom	T		✓				
1050	S S	Research	Telecom	T			✓			
1051	S	R&D	IT	T				✓		✓
1052	S	Pro Dev	IT	T				✓		
1053	S S	Research	IT	T			✓			
1054	M M	R&D	Telecom	T		✓				
1055	S	Research	E. S. C.	T			✓			

Key:
S: Staff,   **S S**: Senior Staff,   **M M**: Middle Manager,   **Pro Dev**: Product Development   **Tech Dev**: Technology Development
Telecom: Telecommunication,   **E. S. C.**: Electrical and electronic sensors and control systems,   **Health**: Healthcare,
IT: Information Technology   **T:** True bootlegging   **Q:** Quasi-bootlegging   **H:** Hardcore bootlegging

5.3.2. Decision makers can understand the idea

As is shows in Table 5.2, 16 interviewees emphasised that the difference in background between the idea generators and management (the decision makers[91]) means that they have different perceptions of the benefits of certain solutions or technology. In other words, often the interviewees have specific background, experience, knowledge and know-how that help them to perceive specific solutions or technologies that is not possible to explain to someone who is not expert in that specific field of the science of engineering. Therefore the decision makers are not able to grasp the interviewee's idea at that stage.

Normally in such cases, the level of perceived uncertainty for the decision makers is much higher than the level of uncertainty for the idea generator. In these circumstances, bootlegging seems to be the only way for employees to collect enough evidence or make enough progress to be able to reduce the uncertainty in the decision makers' minds and so convince them about the feasibility of the idea. As an interviewee commented:

> "*The difficulty is to explain to somebody who doesn't understand the idea and the easy bit is to show them the working product and then they can see the benefits of it.*" (1039, Senior Staff, Product Development)

In contrast to the view presented in the management literature – that hardcore bootlegging is prompted by disagreements with management (Pearson, 1997) or rejection by management (Knight, 1967; Dickson *et al*. 1991) – the findings here suggest

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[91] As mentioned in previous chapter, decision makers are normally one or a group of senior managers who are in position to make R&D decision such as approve or reject R&D projects and allocate budget to different projects.

that disagreement or rejection is not a motivation for bootlegging, nor competing with management nor attempting to prove to them that they were wrong. Of the five hardcore bootlegging discussed by interviewees, not a single interviewee said they had pursued their project to prove management wrong. Rather, because of their knowledge, information and experience, they felt they could see an opportunity, and so they chose to go underground to reduce the uncertainty surrounding their idea until they could persuade the decision makers, for example:

> "*Because it seems like a good idea. Technologically it was a good idea and from the business perspective it was good too… They* [decision makers] *had made up their mind from the beginning ... but as the instrument division grew, we saw that as a bad idea in a number of ways… it wasn't easy to persuade them* [decision makers] *to let us work on it at that stage ...* " (1008, Senior Staff, Technology Development)

Since some of the previous literature emphasises rejection by management as a reason for bootlegging, this issue was investigated further by questioning interviewees as to what they normally do when their ideas get rejected by management. The research findings on this issue, presented in Appendix V, illustrate that rejection by management cannot be considered as a reason for bootlegging.

5.3.3. Having an immature idea

In addition, 14 interviewees can simply submit their idea by writing a one page summary or walking into their manager's office (only 5 of them are product development people). Even in these organisations, employees may choose to go underground because their ideas are immature and the chances of them being accepted remain slim. Thus

bootlegging seems to be a way to incubate newly emerged ideas to the point where they are developed enough to be approved. The following are common observations:

"*… Usually because the ideas are immature and need some work, I am not able to discuss them right away with my manager…*" (1016, Staff, R&D)

"*…That is not the best way to do what you think is right to do. Because you never get management approval for raw ideas…*" (1037, Staff, R&D)

5.3.4. Need to carry out pre-research activities

Furthermore, 15 interviewees' comments suggest that uncertainty about a new idea significantly reduces its chances of getting managerial approval (Table 5.2). These interviewees may not necessarily need to show proof of concept or feasibility to get official approval, as the first group – explained above – need to. However because there is technical uncertainty about their ideas, they feel their chance of getting official approval is too slim. So they explained that they go underground to reduce any technical uncertainty about the process by undertaking pre-research activities. As interviewees commented:

"*The problem was how to do it. I needed to figure out a solution. I had two rough ideas, what would be the solution to this but I needed to do my homework before presenting anything.*" (1020, Staff, Research)

"*…because I wasn't really sure which way I should go and what to do. I needed to do some experiments and I really didn't want to pressure on myself...*" (1051, Staff, R&D)

Most of these interviewees explained that they go underground to reduce any technical uncertainty about the process of developing the idea: by finding out the real problem or

making sure the identified problem is understood correctly (two interviewees); understanding the extent of project (four interviewees); finding a way to solve the problem or showing the solution (five interviewees); making sure that it is solvable (one interviewees). Pearson (1997) refers to this type of uncertainty as uncertainty about the means which is one of the elements that cause bootlegging. Data also shows another type of technical uncertainty which was called uncertainty about the end by Pearson (1997). Five of these interviewees highlighted that they go underground to be able to demonstrate the end result and how it will benefit the organization.

5.3.5. Showing the market demand

Two of them raised market uncertainty as the reason for bootlegging. These interviewees tried to develop the project to the point that they can approach customers and excite them, so they request the product. This way reduces the market uncertainty for the decision makers. One of these interviewees mentioned:

> "*So I think the best way to push this kind of project is to push them through customers' channel. Once the idea gets to the point that it is not a raw idea anymore I would look to see which customer could use this. Then I talk to them and say we can make this and then they contact marketing and sales and request this product. So there is no question about whether or not we can find a market for this idea. Once a customer requested it, the ambiguity about market would be eliminated.*" (1047, Senior Staff, Research)

5.3.6. Avoiding physiological pressure

There are also three other interviewees who mentioned that until the uncertainty surrounding their new idea has been reduced, bootleggers prefer not to put themselves under pressure to deliver benefits and be questioned by the management, for example:

> "… *I really didn't want to put pressure on myself. Because the moment that the management know you are working on a project, they start to ask questions and they want to know how you are making progress*." (1051, Staff, R&D)

As was discussed in the previous chapter (sub-section 4.6.1), there are four interviewees who are given a percentage of their time to work on their projects and pursue their own ideas. Two of these interviewees (1009 and 1045) highlighted the pressure they feel if they reveal their pet projects to the management because of the uncertainty about their ideas.

Let's bear in mind that although a number of interviewees come from organizations or units in which interviewees are (formally or informally) given some freedom, for instance they are allowed to spend a percentage of their time working on their projects or ideas, bootlegging can still occur in this type of organisation. Firstly because, as was mentioned above, they may want to escape psychological pressure. Second, not all of the research, R&D and product development staff in such organisations are allowed to take advantage of this privilege – employees in some units may have more freedom than employees in other units or some employees may have more freedom than their colleagues as result of their previous accomplishments[92].

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[92] This type of freedom given to the employees was discussed in the previous chapter (section 4.6) where the interviewees' freedom was discussed.

5.3.7. Summary of reasons for bootlegging

As a conclusion to this section, at first glance it might seem that there are several reasons for bootlegging; i.e. need to show feasibility or proof of concept, decision makers can understand the idea, having an immature idea, needing to carry out pre-research activities, showing the market demand, and avoiding management pressure[93]. However, all these reasons share one element which is - uncertainty about ideas. The type of uncertainty that bootleggers try to reduce underground seems to be mainly technical uncertainty. Considering the fact that these are well-educated and experienced technical people, this exactly matches their area of expertise. Thus, we can argue that they go underground in order to reduce uncertainty – mainly technical uncertainty – about their ideas, which makes them more convincing for people who are not expert in that particular area. Therefore they manage to increase the chances of getting official approval for their ideas.

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[93] It should be highlighted that 10 interviewees mentioned more than one reason for bootlegging which is shown in Table 5.2.

5.4. Motivation for Bootlegging

Normally when employees come up with a new idea they have three options: approach management to get official approval for their idea, go underground, or simply drop the idea or put it on hold and go back to official work, this is also highlighted by Abetti (1997b). By experience they have learned that the chance of getting official approval at an early stage is slim, as an interviewee highlights:

> "*I learned it hard way that it won't work if you pop in to your boss office and say*
>
> *I have an idea let's do it*" (1026, Senior Staff, Research)

Therefore, practically they have two options: pursue the idea underground or drop it at least for now. To understand why bootleggers choose to go beyond their responsibility and bootleg in a hope of finally getting permission for their projects, it is important to consider their motivations.

5.4.1. Organisation Benefits

The first and most important element that came up in all interviews is the point that interviewees try to fulfill organisations' needs in one way or another. The data strongly suggests that interviewees put their organisation's interests first and thus it could be considered as the primary motivation for bootlegging. They see an opportunity that no one else has spotted and try to get the best out of it. It should be highlighted that these are highly experienced and well-educated scientists and engineers who also happen to be highly motivated and technologically oriented. All interviewees claimed that their bootlegging serves the interests of the organisation in one way or another, for instance:

"I think it is an area that the technology is headed in, the business is headed in, the market is headed in and the competitors are headed in ... we have got to try ..." (1003, Middle Manager, R&D)

"The potential business, if it was successful, was a very great opportunity."(1006, Middle Manager, Product Development)

"... Technologically it was a good idea and from a business perspective it was good too." (1008, Senior Staff, Technology Development)

Such comments are common when the interviewees were asked why they bothered with pursuing the project unofficially and informally. As can be seen from the above comments, the interviewees were not only focused on developing a new technology, they also consider a wide range of issues such as marketing, implementation, operation etc. It must be highlighted that all interviewees emphasise the benefits of their ideas for the organisation as the motivation for bootlegging. None of the 55 interviewees primarily discusses any personal matters as the motivation for bootlegging. So we could conclude that organisation benefits can be considered as the main or primary motivation for bootlegging.

5.4.2. Personal benefits

Although the interviewees did not proactively raised any potential personal benefits as the motivation for bootlegging, the majority of them when they were specifically asked about their personal interests in bootlegging did not deny it. By the end of the interview when an strong connection had been built up between the interviewer and the interviewees, they were specifically asked about personal benefits of bootlegging for themselves and whether they expected to receive the benefit prior to launching bootleg projects. This set of questions clearly shows that there are some personal benefits in

bootlegging. The personal benefits of bootlegging – shown in Table 5.3 – can be divided into two groups, tangible and intangible benefits. The following subsections expand on tangible and intangible benefits of bootlegging for interviewees. This is an issue that has been ignored in previous research on bootlegging.

5.4.2.1. Tangible personal benefits of bootlegging

As is shown in Table 5.3, one of the tangible benefits that interviewees would receive if the project succeeded in getting approved, implemented and/or patented is financial benefits; such as financial rewards, bonuses or patent incentives that they may receive. Financial benefits only existed for five interviewees. For the rest of interviewees, their innovative attempts, even if they result in a successful product, would not be rewarded financially. It must be also mentioned that even for these five interviewees the amount is not considerable or it is based on variety of elements that make the financial benefit infeasible for them. Yet, they reap other benefits, as two of them mentioned:

> "*Emotionally, I very much appreciate being able to see a product hit the market. Specially when it's done well… You tend not to get rewarded until the product hits the market from company's stands point… there wasn't really reward associated with this.*" (1002, Senior Staff, R&D)

> "*The patent incentive award is very small. Being a patent and paper author was the most significant reward from this project*" (1045, Staff, Research)

As is clear from above comments, the financial benefit seems not to be very important for interviewees while other tangible and intangible personal benefits are emphasised.

Other tangible personal benefits from bootlegging which may drive interviewees to undertake such activities is the potential for patent applications (highlighted by 6

interviewees) and academic or conference papers coming off bootleg projects (raised by

6 interviewees). The following are usual comments among this group of interviewees:

Table 5.3: Bootlegging motivations

Code	Position	Primary responsibility	Organisation benefits	Financial benefits	Patent application	Publication & paper	Respect & recognition	Learning & experience	Satisfaction from innovation
				Tangible benefits			Intangible benefits		
1001	Staff	R&D	✓		✓				
1002	Senior staff	R&D	✓	✓					✓
1003	Middle manager	Pro Dev	✓					✓	✓
1004	Staff	Pro Dev	✓				✓	✓	
1005	Staff	Research	✓				✓		
1006	Middle manager	Pro Dev	✓						
1007	Middle manager	Pro Dev	✓						
1008	Senior staff	Tech Dev	✓						
1009	Middle manager	R&D	✓	✓					
1010	Middle manager	Pro Dev	✓						✓
1011	Senior staff	Pro Dev	✓						✓
1012	Staff	Pro Dev	✓					✓	✓
1013	Senior staff	Pro Dev	✓				✓	✓	
1014	Senior staff	Pro Dev	✓				✓		
1015	Middle manager	Pro Dev	✓					✓	
1016	Staff	R&D	✓				✓		
1017	Staff	Pro Dev	✓						✓
1018	Staff	Research	✓					✓	✓
1019	Staff	Research	✓					✓	
1020	Staff	Research	✓					✓	
1021	Middle manager	Pro Dev	✓				✓	✓	
1022	Staff	Pro Dev	✓				✓		
1023	Staff	Pro Dev	✓				✓		
1024	Senior staff	Pro Dev	✓						✓
1025	Staff	Pro Dev	✓						
1026	Senior staff	Research	✓					✓	
1027	Middle manager	Pro Dev	✓		✓				
1028	Senior staff	Research	✓						✓
1029	Staff	Pro Dev	✓					✓	
1030	Staff	Tech Dev	✓						
1031	Senior staff	Research	✓		✓			✓	✓
1032	Staff	Pro Dev	✓					✓	✓
1033	Middle manager	Pro Dev	✓						✓
1034	Senior staff	Pro Dev	✓				✓		
1035	Staff	R&D	✓					✓	
1036	Middle manager	R&D	✓				✓		
1037	Staff	R&D	✓				✓		
1038	Staff	R&D	✓						✓
1039	Senior staff	Pro Dev	✓				✓		
1040	Middle manager	Research	✓			✓			
1041	Staff	Pro Dev	✓						✓
1042	Staff	Research	✓			✓			
1043	Staff	R&D	✓						✓
1044	Middle manager	Research	✓	✓	✓	✓			
1045	Staff	Research	✓	✓	✓				
1046	Staff	Tech Dev	✓	✓	✓				
1047	Senior staff	Research	✓					✓	
1048	Staff	Pro Dev	✓				✓		
1049	Senior staff	Research	✓			✓	✓		✓
1050	Senior staff	Research	✓			✓			
1051	Staff	R&D	✓				✓		
1052	Staff	Pro Dev	✓				✓		✓
1053	Senior staff	Research	✓			✓			
1054	Middle manager	R&D	✓					✓	
1055	Staff	Research	✓					✓	

Key: **Tech Dev**: Technology Development; **R&D**: Research & Development; **Pro Dev**: Product Development

"Well, it was good for me too. Projects like this when we file a patent or submit a conference paper would look good in my resume. If I get laid off and I have to look for a new job, that will help" (1001, Staff, R&D)

"I got a paper out of it and I enjoyed working through these things." (1053, Senior Staff, Research)

In general, the tangible benefits of bootlegging are only pointed out by 13 interviewees. Even for these interviewees the most feasible tangible benefit is to author an academic or conference paper or a patent. Interviewees, even those that named financial benefits, would not count on it as a personal benefit of bootlegging. As is clear in Table 5.3, the tangible benefits of bootlegging are also seen to be more common among interviewees in Research, Technology Development and R&D.

5.4.2.2. Intangible personal benefits of bootlegging

On the other hand, as is shown in Table 5.3, there are also intangible personal benefits from bootlegging. It seems that these types of benefits is the most anticipated and therefore expected personal benefits of bootlegging. One of the intangible benefits of bootlegging for interviewees is the good reputation and recognition in their organisation or industry which is gained when they succeed in delivering an innovation. This is mentioned by 16 interviewees. It is important to them because it normally results in gaining management and colleagues' trust and often achieving the freedom to pursue further projects. As interviewees commented:

"I think my reward was totally in trust. Once I did this I was told that I was going to be handling the project as the whole and getting it to be purchasable and I was given a lot of authority and trust. I was told in a meeting in front of employees that all employees had to do whatever I said to deliver what I was

asking for… So it was really allowed me to do whatever I wanted to do from that moment on. The autonomy came from that is what I consider as a real value because after that when I really start going to different innovation." (1014, Senior Staff, Product Development)

"*It was a lot of fun. It changes things and the things are radically done. So you get really excited about that because you would get a name in the industry and would be well-known and that's so and so ... So it is a lot of personal recognition coming out that.*" (1041, Staff, Product Development)

Another intangible benefit of bootlegging for interviewees is learning new things, experimenting with new methods and gaining experience. Bootleg projects often required experiments to learn things and experience methods that may not be necessarily practiced or learned as a part of their official projects. Therefore bootlegging may also provide interviewees unique learning and experience-gaining opportunities. As is shown in Table 5.3, this is highlighted by 17 interviewees (7 research, 2 R&D and 8 product development people)

"*Even though I have technical expertise, I learned a lot of new stuff personally. It always is a learning process…*" (1019, Staff, Research)

The final benefit of bootlegging is the satisfaction they receive from achieving innovation and making something new that works and benefits their organization. As is clear from Table 5.3, among 17 interviewees who highlight this as the benefit of bootlegging; four were from research unit, two were from R&D units and 11 were from product development. This implies that satisfaction from achieving innovation is more of a concern for whose work is product development.

"For me there are two things. First the experience and knowledge is really valuable. Second seeing the project result in innovation and new thing is very satisfying for me..." (1032, Staff, Product Development)

5.4.2.3. No personal benefits

As is shown in the Table 5.3, there are five interviewees who said the bootleg project would not benefit them personally. In addition, some of the interviewees who highlight personal benefits for bootlegging claim that they did not expect these benefits when they were launching their bootleg projects. Therefore, a conclusion can be drawn from discussions presented here that personal benefits can be considered as a secondary motivation for bootlegging and not the primary inspiration such as organisation's interests.

5.4.3. Summary of bootlegging motivations

Bootleg projects benefits for organisations are emphasised by all interviewees as the motivation for initiating bootleg projects. Thus it could be considered as the primary motivation for bootlegging. Interviewees did not proactively mentioned any personal benefits as the motivation for bootlegging however when they were specifically questioned, the majority of them – apart from five of them – name some personal benefits. It must also be mentioned that not all of them expect to receive these benefits prior to launching bootleg projects. So it could be said that personal benefits can be considered as secondary motivations for bootlegging.

5.5. Other Criteria for Bootlegging

In addition to the reasons for bootlegging and the motivation for bootlegging, there are other elements that influence interviewees decisions to bootleg. These elements are named as criteria for bootlegging since they are considered by the interviewees prior to undertaking the activity. Table 5.4 shows these elements considered by the interviewees as the criteria for bootlegging.

5.5.1. Chance of getting managerial approval

One of the elements that influences bootleggers' decisions is the possibility of eventually getting managerial approval. This element embraces several aspects: the organisation and specifically management openness to new ideas; the benefits of the idea for the organisation and compatibility with the organisation's business.

In the previous chapter – subsection 4.6.2 where the relationship between interviewees and their direct manager were discussed – their direct manager's openness to new ideas was discussed. It was mentioned that in most cases interviewees have good relationship with their direct manager. For those exceptions who have had problematic relationships with their direct manager, it was highlighted that they may face difficulties in terms of pursuing bootleg projects. On the other hand, it was also clear in section 4.4 – in the previous chapter – that the management of all these organisations respect interviewees' ideas. This seems to be a significant element since those who have had a problematic relationship with their direct manager would be more careful when they decided to pursue a project underground. Besides, those who have work under different management mentioned that if they felt that their ideas were neglected or not respected, they would not bootleg, they commented:

Table 5.4: Considerations for choosing to go underground

Code	Position	Primary responsibility	Chance of getting managerial approval	Ability to progress enough to convince management	Career risk	Technical risk
1001	Staff	R&D	✓	✓		✓
1002	Staff	R&D	✓	✓		✓
1003	Senior Staff	R&D				✓
1004	Middle Manager	Pro Dev	✓	✓	✓	
1005	Staff	Pro Dev	✓			✓
1006	Staff	Research	✓	✓		✓
1007	Middle Manager	Pro Dev	✓	✓		✓
1008	Middle Manager	Pro Dev	✓			
1009	Senior Staff	Tech Dev	✓		✓	
1010	Middle Manager	R&D	✓	✓	✓	
1011	Middle Manager	Pro Dev	✓	✓		
1012	Senior Staff	Pro Dev	✓	✓		✓
1013	Staff	Pro Dev	✓	✓		✓
1014	Senior Staff	Pro Dev	✓	✓		✓
1015	Senior Staff	Pro Dev	✓	✓		✓
1016	Middle Manager	Pro Dev	✓	✓		✓
1017	Staff	R&D	✓	✓		
1018	Staff	Pro Dev	✓			✓
1019	Staff	Research	✓	✓		
1020	Staff	Research	✓	✓		
1021	Staff	Research	✓	✓		✓
1022	Middle Manager	Pro Dev	✓	✓		✓
1023	Staff	Pro Dev	✓	✓		
1024	Staff	Pro Dev	✓	✓		✓
1025	Senior Staff	Pro Dev	✓	✓		✓
1026	Staff	Pro Dev	✓			✓
1027	Senior Staff	Research		✓	✓	
1028	Middle Manager	Pro Dev	✓	✓	✓	
1029	Senior Staff	Research	✓	✓		
1030	Staff	Pro Dev	✓			✓
1031	Staff	Tech Dev	✓	✓		✓
1032	Senior Staff	Research	✓	✓		
1033	Staff	Pro Dev	✓			✓
1034	Middle Manager	Pro Dev	✓	✓		
1035	Senior Staff	Pro Dev	✓	✓	✓	
1036	Staff	R&D	✓	✓	✓	
1037	Middle Manager	R&D	✓	✓		✓
1038	Staff	R&D	✓	✓		
1039	Staff	R&D	✓	✓		
1040	Senior Staff	Pro Dev	✓	✓	✓	
1041	Middle Manager	Research	✓	✓		
1042	Staff	Pro Dev	✓	✓		✓
1043	Staff	Research	✓	✓		
1044	Staff	R&D		✓		✓
1045	Middle Manager	Research	✓			
1046	Staff	Research	✓	✓		
1047	Staff	Tech Dev	✓	✓		
1048	Senior Staff	Research	✓	✓		✓
1049	Staff	Pro Dev	✓			✓
1050	Senior Staff	Research	✓	✓		
1051	Senior Staff	Research	✓	✓		✓
1052	Staff	R&D	✓	✓		✓
1053	Staff	Pro Dev	✓	✓		✓
1054	Senior Staff	Research	✓	✓		
1055	Middle Manager	R&D	✓	✓		✓

Key: **Tech Dev**: Technology Development   **R&D**: Research & Development   **Pro Dev**: Product Development

"*Before a year and a half ago, I had a supervisor who would not allow me to pursue anything. Even if I pursued something and I told him that I did this, he would have said I don't care…*"(1001, Staff, R&D)

Other issues that influence the chance of getting official approval are the benefits of the idea for the organisation and whether it matches their organisation business. Section 5.2 of this chapter – which discusses the first steps taken by the interviewees – explains that when interviewees come up with a new idea for a project, they initially evaluate it to see how it is going to benefit the organisation. As was previously shown and is clear from following quote, they consider a variety of elements such as technology, market, product and implementation if they are relevant. The following comment highlights this issue:

> "*I would ask a number of people if they think it is a valid project … do you think there is a market for it? Is this worth doing it? … if it is something like new a product for example we need to access whether there is a substantial enough market. So we will go through and do that. … How much money does it take to do the development? That is a rough estimation. And how much time we need to work on it?*" (1052, Staff, Product Development)

Besides, previously in this section, it was shown that organisations' benefits are the main motivation for bootlegging. Section 4.8 – in the previous chapter- which covers the diversity of bootleg projects that were discussed in details with interviewees extensively argues that they match organisations' business. The following comments are also some evidences of this issue:

> "*What I do is peer review, first. Then I look at how that fits in our business and how much it benefits the organisation. If it was viable to do secretly, I would do it.*"(1008, Senior Staff, Technology Development)

> "*Depends on the idea. If I believe that this is good idea with significant benefit for the business and there is chance to convince the board maybe later when I*

have more results, then I would do it. There is another thing; I must be able to do

it without significant resources." (1039, Senior Staff, Product Development)

5.5.2. Ability to make enough progress to convince management

As can be seen from above quotes, it is also important to employees to be able to make enough progress underground so that they can convince the decision makers that the idea is valid and of benefit to the organisation. If this goal seems achievable to them underground, they start to bootleg. Otherwise they have no option but to forget the idea, or submit the idea officially to the decision makers without any preparation.

"*I guess it depends on how big the idea is. If it is something that is going to be small change, I will go ahead and put something together ... But if it's something bigger that I can do independently, that is another story.*"(1012, Staff, Product Development)

5.5.2.1. Risk

The final element that is considered by interviewees and influences their decision to go underground is the element of risk. Interviewees highlighted that they consider the risk involved in their projects when they make decision to go underground or not. Risk seems to be different from project to project. However, interviewees are well aware of the risk they are able to and willing to undertake. There are two types of risk, career risk – risk that influences the employee's career and credibility in the company – and project risk – which refers to risk of failure, mainly from technical perspective.

Data shows that those who have more experience – such as middle manager and senior staff – would undertake riskier projects than the less experience employees. Those who

are experienced – such as middle managers or senior staff - might even put their career at risk, possibly because they are confident. As interviewees commented:

"*There is always the risk it could be a career-terminating move. If it goes badly wrong it could be very difficult.*"(1036, Middle Manager, R&D)

On the other hand, less experienced interviewees – such as normal staff – seem to consider project risk more seriously. They often avoid undertaking projects that have career risk. The maximum risk they are willing to undertake is the technical risk of projects. As interviewees mentioned:

"*If it's too risky or it takes a lot of time, I wouldn't do it. Because I am not in a position to take huge risk…*"(1025, Senior Staff, Pro Dev)

"*The risk is it doesn't work and it wastes your time*" (1037, Staff, R&D)

Therefore, when interviewees who are relatively less experienced such as junior staff discuss the risk of their projects, they consider their bootleg projects as projects with no or little risk. This will be discussed at the end of this chapter that normally more experienced interviewees undertake relatively more radical projects – with higher level of risk – in comparison to less experienced interviewees – staff – who undertake more incremental projects with lower level of risk.

5.6. Chapter Summary

This chapter primarily tries to understand the rational behind bootlegging to answer the first research question, that is why employees choose to bootleg. To answer this question, the study initially discussed the first steps undertaken by interviewees when the come up with new ideas. Then it covers reasons to choose bootlegging instead of acquiring official approval, interviewees' motivations and criteria for bootlegging which also can be considered as the element that influence interviewees' decision to bootleg.

The research findings show that employees do not normally start by approaching decision makers to acquire official permission for their project, as there is little hope of getting managerial approval for a recently emerged idea at this stage. This is in line with Augsdorfer's (2008) claim that R&D employees are in a chicken egg situation. They need to get permission for their ideas, however in order to get permission they need to reduce uncertainty surrounding their ideas. Instead, our interviewees begin with a variety of first steps.

It was discussed that this does not necessarily means that they initiate bootlegging every time they come up with a new idea. There are several elements that influence interviewees' decisions to bootleg. Figure 5.1 is the framework that shows elements that influence interviewees' decision to bootleg. Although the data does not show a systematic decision making process for bootlegging, these elements seem to be crucial as they influence interviewees' decision to bootleg.

Figure 5.1: Elements that influence interviewees' decision to bootleg
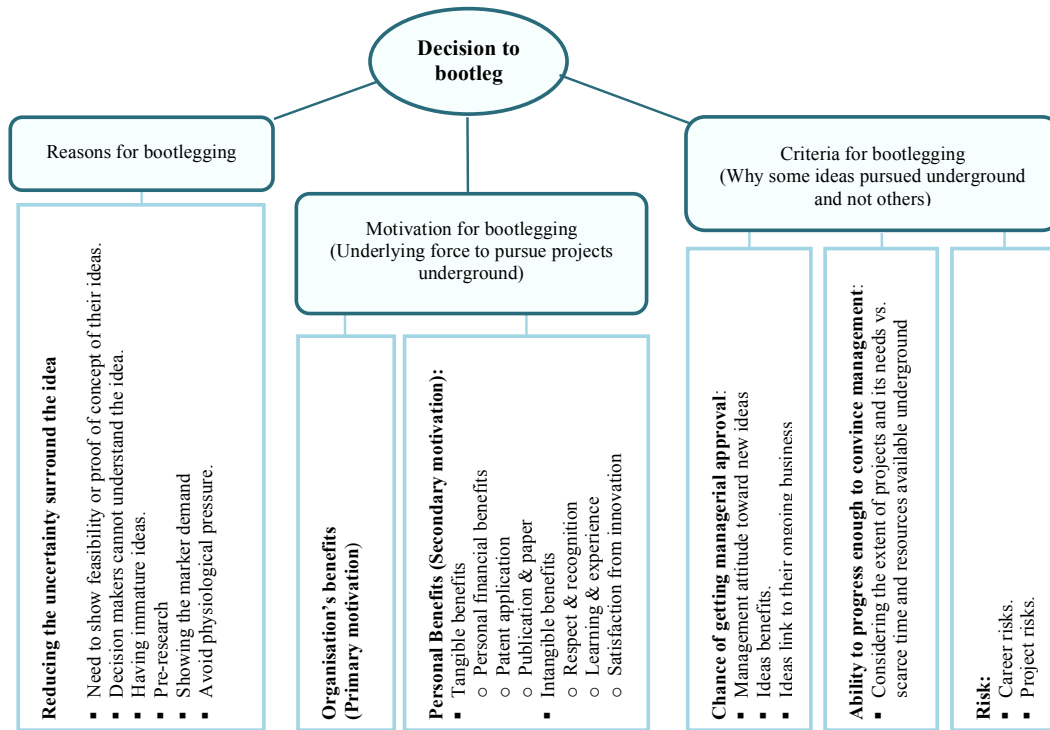
The first element that influences their decisions to bootleg instead of following the idea through official channel – approaching decision makers or officially submitting the idea to get official approval is that some interviewees are normally asked to produce a feasibility study or proof of concept when they present their ideas to decision makers, so they bootleg to prepare those. Some could not talk decision makers into approving their ideas because decision makers were unable to understand the idea at its early stages or had a different perspective which set them against the idea (i.e. uncertainty for decision makers was higher than uncertainty for the bootlegger). Several interviewees stated that even when they were able to present their idea to a decision maker, they preferred not to do it at the early stage because the likelihood of getting approval for an immature idea was so low, thus they bootleg to develop their idea further to raise their chance of getting official approval. Other interviewees chose to go underground in order to undertake pre-research activities to reduce any technical uncertainty associated with how to pursue the

project – making sure that the real problem was identified, that the problem was solvable using the time and resources available, understanding the extent of the project, achieving a clear solution – or the end result of project – clearly demonstrating the benefit of the idea to the organisation. Two interviewees highlight they need to reduce market uncertainty by convincing customers to ask for the product. Finally, for three other interviewees avoiding psychological pressure is another reason for bootlegging since they are not certain about some aspects of their projects, whether they is going to work.

Consequently, at first glance it might seem that there are a number of reasons for going underground. However, deep analysis of the data here and the examination of the interviewees' circumstances and experiences show that the issue underlying all these reasons is the uncertainty – mainly technical uncertainty – which accompanies the early stage of innovation. The fundamental reason bootleggers choose to go underground is in order to reduce this uncertainty, and their ultimate purpose is to improve their chances of eventually securing management approval to implement the idea officially.

In addition to the reason for bootlegging, it is important to discuss, as is shown in Figure 5.1, what motivates these interviewees to undertake bootlegging. The primary motivation for bootlegging is benefits of the project for the organization. Having learned how their ideas are assessed by decision makers, employees know they must consider a wide range of issues such as implementation, operation, marketing etc. These highly-motivated, well-educated and experienced employees can see opportunities that others may not be able to spot.

Besides, in contrast to previous research (Augsdorfer 1996, 2005, 2008; Abetti 1997a, 1997b, 1999a, 1999b) that neglect personal benefits of bootlegging, this study found there are personal benefits for bootlegging – which can be considered as secondary

motivation. This secondary motivation can be categorized into two groups: tangible and intangible benefits.

Tangible benefits include financial benefits – such as financial rewards, bonuses or patent incentives which are insignificant – patent applications and conference and journal papers. These benefits seem to be more important to interviewees whose primary responsibility is research rather than those whose work is product development.

Intangible benefits of bootlegging include gaining respect and recognition, learning and experience, and satisfaction from innovation. Good reputation and recognition in their organisation or industry which is gained when they succeed in delivering an innovation are important to bootleggers. Another intangible benefit of bootlegging for interviewees is learning new things, experimenting with new methods and gaining experience which may not necessarily be gained by pursuing official projects. The final benefit of bootlegging is the satisfaction they receive from achieving innovation and making something new that works and benefits their organisation. This seems to be more important to those who focus on product development rather than research and technology development.

The final group of elements that influence bootleggers' decisions, shown in Figure 5.1, is the criteria for bootlegging which explains why some ideas are pursued underground and not other. One of these elements is the possibility of eventually getting managerial approval. If the interviewees see no possibility of eventually getting managerial approval, there is no point in bootlegging[94]. The second issue is how well the idea matches the company business and whether it could benefit the company – this is also

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[94] This seems to be in contrast with two cases (Toshiba Laptop and Word Processor) discussed by Abetti (1997a, 1999a) in which projects were pursued underground even after unsuccessful market test.

emphasised by Abetti (1997a, 1997b, 1999a) that it is necessary for ultimate success of bootlegging. The last element that influencing interviewees' decisions for bootlegging is the risk involved in pursuing bootleg projects. Two types of risk are considered by interviewees, career risk and project risk. Those who have more experience – such as middle managers and senior staff – would undertake riskier projects than less experience employees. On the other hand, less experienced staff consider project risk more seriously and they often avoid undertaking projects that have career risk.

Chapter 6:

Bootlegging Operation

6.1. Introduction

The whole purpose of this chapter is to answer the second research question: how bootleggers find the time and acquire the resources and expertise to operate clandestinely. To understand how bootleggers operate underground, this research initially set out to investigate how the three key requisites of a bootlegging operation – resources, expertise and time – are acquired. However, a fourth element emerged in the course of pilot study and then its significance re-emerged in the first few main interviews. The fourth element is the support required to reveal bootleg projects. The importance of this element has clearly been underscored by previous researches.

6.1.1. Layout of this chapter

The next section (6.2) discusses the type of time used for bootlegging by interviewees. The third section (6.3) also address the time used for bootlegging including the length of the underground process in the bootleg projects discussed in detail and the percentage of interviewees' work times used for bootlegging. This is followed, in section 6.4, by a discussion of the resources used in the bootleg projects discussed, including the types of resources used, and more specifically how interviewees gather the required resources. To complete the discussion on this matter, Appendix VII presents interviewees' evaluations of resources used for the bootleg projects discussed. The fifth section (6.5) presents the number of people who participated in these bootleg projects in order to understand how interviewees gather the expertise and support they need. This section specifically covers the role of other participants in the bootleg projects discussed and how interviewees choose whom to approach. The sixth section (6.6) covers a summary of the discussions conducted with interviewees on the pros and cons of bootlegging processes as opposed

to official processes. The chapter concludes, in section 6.7, with a summary of this chapter and the presentation of a conceptual model that explains how interviewees fulfil their bootleg projects needs while operating clandestinely.

6.2. Use of Time

With regard to time, there are several questions that must be answered. When do bootleggers work on their bootleg projects? If they spend their working hours on bootleg projects, what percentage of their time is used for bootlegging? Does this affect the amount of time they spend on official projects? How long do bootleg projects last underground? In order to answer these questions, the research investigated how interviewees operate on a daily basis: the different tasks they need to do, how loosely their time is structured, how their time is monitored, etc.

In terms of time management, chapter four presents a variety of findings. One issue that was raised in section 4.5 is that interviewees are normally required to execute different tasks such as producing documents and reports and attending meeting and giving papers. In addition, section 4.5 illustrates that they pursue more than one official project at a time. Thus, they need to prioritise their time to be able to work on different projects concurrently and to complete their tasks. Chapter four also shows how interviewees are in charge of managing and prioritising their time, unless there is an emergency to be addressed or a deadline coming up. Being in charge of their own time and having a number of tasks and more than one project gives interviewees the little freedom and flexibility they require to work on their own ideas and projects without anyone else noticing. Bearing in mind that their work is highly specialized, it is not easy for other people in the organisation – not even their direct manager or close colleagues – to determine whether interviewees are working on an official project or something else.

Another issue that was presented in an earlier chapter – subsection 4.6.1 – was the freedom interviewees have and the nature of this freedom. 34 interviewees mentioned that they are – either formally or informally – given some freedom to pursue their own

interest and ideas whereas 21 interviewees were not. However 11 of these 21 interviewees highlighted that they enjoyed a level of freedom because of the nature of their work and the remaining 10, although they do not have freedom to pursue their interests and ideas, are able to explore some directions in their work.

Having considered the level of freedom interviewees enjoy, this research tries to investigate how they use their freedom to pursue bootleg projects. It is important to consider differences in types of time used by interviewees with different level of freedom[95]. Table 6.1 illustrates different types of time used by interviewees to bootleg and interviewees' levels of freedom – extensively discussed in Table 4.3 in chapter 4.

As is shown in Table 6.1, all interviewees, apart from one of them (1030), use organisation time for bootlegging which means they work on their bootleg projects during the normal working hours (8 am to 5 pm) and often after hours or weekends which are shown in the table as extra hours[96]. While 40 interviewees stated that they stayed extra hours at work to be able to complete their official work and pursue their bootleg project. 12 interviewees said they also work at home, for example:

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[95] This must be highlighted that all of the interviewees needed to operate clandestinely and hide their projects from management sight especially from decision makers for the reasons discussed in the previous section.

[96] The extra hours, after official work hours and at weekends, that employees spend on bootlegging in their organisation must be considered as organisation time. Firstly, because bootleggers mix their bootleg projects with official works. They often bootleg in official working hours and then spend extra hours to catch up with their official work. Secondly, they spend extra hours and weekends at their office to bootleg while they pretend they are working on official projects.

Code	Positions	Primary responsibilities	Industry	Freedom to pursue their interests and ideas*	Work hours (e.g. 9am – 5pm)	Extra hours at work (after 5pm and weekends)	Leisure time (at home or on commute)
1001	S	R&D	Health.	Because of the nature of their work	✓	✓	
1002	S S	R&D	E. S. C.	Informally given	✓	✓	
1003	M M	Pro Dev	IT	Because of the nature of their work	✓	✓	
1004	S	Pro Dev	E. S. C.	Because of the nature of their work	✓	✓	
1005	S	Research	Health	Informally given	✓	✓	
1006	M M	Pro Dev	E. S. C.	Informally given	✓		
1007	M M	Pro Dev	E. S. C.	Don't have	✓	✓	
1008	S S	Tech Dev	Health	Informally given	✓	✓	
1009	M M	R&D	E. S. C.	A Percentage is given	✓		
1010	M M	Pro Dev	Health	Informally given	✓		
1011	S S	Pro Dev	E. S. C.	Don't have	✓	✓	
1012	S	Pro Dev	E. S. C.	Informally given	✓	✓	✓
1013	S S	Pro Dev	Health	Don't have	✓	✓	
1014	S S	Pro Dev	Health	Because of the nature of their work	✓	✓	
1015	M M	Pro Dev	E. S. C.	Because of the nature of their work	✓		✓
1016	S	R&D	IT	Informally given	✓	✓	
1017	S	Pro Dev	IT	Don't have	✓		✓
1018	S	Research	Telecom	Informally given	✓	✓	
1019	S	Research	IT	Formally given	✓	✓	
1020	S	Research	E. S. C.	Formally given	✓	✓	
1021	M M	Pro Dev	Health	Informally given	✓		
1022	S	Pro Dev	E. S. C.	Don't have	✓	✓	
1023	S	Pro Dev	Telecom	Don't have	✓	✓	
1024	S S	Pro Dev	Health	Informally given	✓	✓	
1025	S	Pro Dev	E. S. C.	Don't have	✓	✓	
1026	S S	Research	Telecom	Formally given	✓	✓	✓
1027	M M	Pro Dev	Health	Don't have	✓		
1028	S S	Research	IT	Informally given	✓	✓	
1029	S	Pro Dev	IT	Don't have	✓		✓
1030	S	Tech Dev	Telecom	Formally given			✓
1031	S S	Research	IT	Because of the nature of their work	✓	✓	
1032	S	Pro Dev	Health	Don't have	✓	✓	
1033	M M	Pro Dev	Health	Informally given	✓	✓	
1034	S S	Pro Dev	IT	Informally given	✓	✓	
1035	S	R&D	Health	Informally given	✓	✓	
1036	M M	R&D	E. S. C.	Because of the nature of their work	✓	✓	
1037	S	R&D	IT	Because of the nature of their work	✓	✓	
1038	S	R&D	IT	Because of the nature of their work	✓	✓	
1039	S S	Pro Dev	IT	Informally given	✓	✓	
1040	M M	Research	Telecom	Informally given	✓		
1041	S	Pro Dev	E. S. C.	Because of the nature of their work	✓	✓	
1042	S	Research	Telecom	Formally given	✓		✓
1043	S	R&D	IT	Formally given	✓	✓	
1044	M M	Research	Telecom	Formally given	✓	✓	
1045	S	Research	Telecom	A Percentage is given	✓		
1046	S	Tech Dev	Telecom	A Percentage is given	✓	✓	✓
1047	S S	Research	IT	A Percentage is given	✓		
1048	S	Pro Dev	E. S. C.	Because of the nature of their work	✓		✓
1049	S S	Research	Telecom	Formally given	✓	✓	✓
1050	S S	Research	Telecom	Informally given	✓		✓
1051	S	R&D	IT	Informally given	✓	✓	
1052	S	Pro Dev	IT	Informally given	✓	✓	
1053	S S	Research	IT	Formally given	✓	✓	
1054	M M	R&D	Telecom	Informally given	✓	✓	✓
1055	S	Research	E. S. C.	Informally given	✓		

Table 6.1: Having freedom to pursue their interests and ideas

Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

* This was shown in Table 4.3 and extensively explained in chapter 4.

"*Very well. Projects are generally pretty fun so they kind of steal over home and weekend. I work 50-60 hours a week and then when I leave my office and I am not there, I still keep thinking about my work.*" (1026, Senior Staff, Research)

As is shown in the table, only one interviewee (1030) said that he spent none of the organisation's time on the bootleg project discussed. He only worked at home or while he was commuting to work. This was because the nature of the project discussed with him was software development.

6.2.1. Using organisation time to bootleg

This issue was also discussed in Chapter four – section 4.5 – that all interviewees said that their time is not tightly structured, they are in charge of managing their time and they have a degree of flexibility; unless there is an emergency or they reach a deadline. This is also clear from the comments above and also the following comment:

"*I could just fit in my working hours. It is very informal within our organization. It doesn't really matter if you spend some little more time doing a certain project in weeks or months as long as you are doing your work. It is reasonably flexible.*"
(1018, Staff, Research)

The above comments are from those who mentioned that they have some freedom since either they are given some degree of freedom or they gain freedom because of the nature of their work. However, what is more interesting to know is how the 10 interviewees who are not given freedom and claim that they do not have autonomy to pursue their interests and ideas could bootleg while they are at work. The following two comments are common among this group of interviewees:

"*The independent part... You could look busy at your desk and they would never know...* [My boss] *would be the only one that would ask a question and he was busy on his own projects. So I would have some stuff set up where I can test …* [the system]" (1023, Staff, Product Development)

"*I need to wait for … a project that I have been assigned to … that is paid by a customer to solve … Then I can start the conversation in another context where the context isn't R&D but nobody cares what you do because you have budget … I said ok that would take us 50 days to do. Then I could do it by spending three weeks … [work on my project] and 30 days to do what customer wanted and everybody was thrilled.*" (1029, Staff, Product development)

As is clear from above comments, those interviewees who have no freedom yet because their time is budgeted based on the projects they have assigned to them, they can find a way to create some free time for themselves to pursue their projects. It can be inferred from all quotes presented in this section that all the 54 employees who bootleg during working hours mix their official work with their bootleg projects in order to hide them from management. The interviewees were of the opinion that bootlegging must not be allowed to get in the way of official projects as this can lead to trouble with managers, as an interviewee mentioned:

"*… sometimes we are busy with official projects. So I had to pretend that I was working on an official project but in fact I was working on the unofficial project. Obviously in the mean time, I had to deliver my official projects on time. Otherwise people would get suspicious and I would be questioned as to why my productivity was low.*" (1026, Senior Staff, Research)

In larger organisations time is not usually precisely budgeted, particularly for those in research and technology development units. These people therefore have more freedom to bootleg, especially if they are senior staff or middle managers. In smaller organisations with relatively modest R&D units, time is often budgeted to specific projects. This is particularly true in product development units, especially for relatively less experienced staff. In such circumstances, bootleggers carry out their bootleg projects by finding an official project to charge their bootleg time to, for example:

> "*Then I saw an opportunity for this in …* [a major official project] *and we have a moderately generous time for this that gives us a little bit of room to play with it. So I had six weeks for enhancement of …* [the product] *so I realized that I don't need all six weeks and I drag that two weeks project and put it in...*" (1017, Staff, Product Development)

As is highlighted by 21 interviewees, there are also slack time between the end of one project and the beginning of the next. Once a deadline has passed, they are normally able to find some slack time to bootleg until the next deadline is due[97]. This may be a few days or a week and is a perfect opportunity for bootlegging.

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[97] Another issue raised by the interviewees was the ways in which the current economic downturn has influenced R&D activities and thus bootlegging. First, it has led to a reduction in the number of R&D projects which means more slack time. Thus bootleggers have more time to bootleg. On the other hand, a number of bootleggers mentioned that the current situation has resulted in shrinking R&D budgets and layoffs in their units. This means that projects are carried out by fewer people, who have a lot more work to do. Moreover, fear of redundancy means staff are putting all their efforts into keeping up with their official work and improving efficiency.

> "*A dozen of my colleagues were laid off recently which made everyone nervous* [in our unit] *… anything that lowers your productivity puts you in risk of losing your job…*" (1023, Staff, Product Development).

"*So there are occasional times when everything is quite down and I have free time that is not already allocated. Like after the last months, I feel there was about three weeks when I haven't had a big backlog of work. In those periods I tend to work on …* [bootleg projects]" (1025, Staff, Product Development)

Even when R&D staff are under pressure to meet a deadline, bootlegging is not completely impossible and they still find time to work on their ideas, as is mentioned in following comment:

"*There have been other times that I played around. There was also a period when we were so busy and I had some ideas on ways that we could make development faster and ways we can improve our general core product to make easier to do certain things. I just played around to just see if it is possible…*" (1025, Staff, Product Development)

6.2.2. Use of Leisure time to bootleg

Not all interviewees are able to work on their bootleg projects while they are away from their laboratory environment. Those whose work is software development, algorithm development, computer coding, etc.; in another word, they can work using a computer – no matter which industry they are in – are able to work on their bootleg projects while they are away from the work place. This is in line with Pearson's (1997) theory.

This research identified two different types of impacts of the current economic downturn in R&D units and bootlegging. This research did not set out to measure these two effects of the economic downturn, so it is unable to identify whether the current situation is leading to more or less bootlegging.

On the other hand, those whose work is dependent on pharmaceutical, metal and material, and hardware laboratories are not able to pursue their bootleg projects away from their working environment. Thus their bootlegging is limited to work hours and extra hours they spend at work.

6.2.3. Summary of use of time

Consequently, bootlegging is mainly done in the organisation's time, no matter whether they are given freedom to do so or not. In addition to having a flexible schedule, having more than one project to work on and different tasks to do makes it easier for them to hide their activities. This enables them to work on bootleg projects meanwhile. This is also highlighted by Augsdorfer (1996), having different activities makes it impossible for management to keep track of R&D staff time and so they gain the opportunity to bootleg. In addition, this research showed that they can charge their time to official projects, pretend to be working on official projects while they bootleg, create some extra room for themselves by asking for more time than they required, mixing their bootleg projects with official projects, etc.

6.3. Time Spent on Bootleg Projects

So far, it has been shown that organisation time is used to pursue bootleg projects. This research also investigates how much organisation time is spent on bootlegging. Specifically, it looks into how long bootleg projects – discussed by interviewees – lasted underground and what percentage of interviewees' work time was spent on these projects. Table 6.2 shows the number of months each bootleg project discussed by interviewees lasted underground (column six) and the average of interviewees' work time spent on the discussed projects (column seven). These can be considered as indicators of amount of time spent on these bootleg projects.

As was previously mentioned, only one interviewee (1030) mentioned that he did not use any organisation time to pursue his bootleg project. If he is put out of the calculation, on average, bootleg projects last over 5 months and interviewees spend 26% of their time on bootleg projects. Figure 6.1 and 6.2 respectively show the distributions of months discussed bootleg projects lasted underground and percentage of work hours spent on these projects.

Figure 6.1: Distribution of months bootleg projects lasted
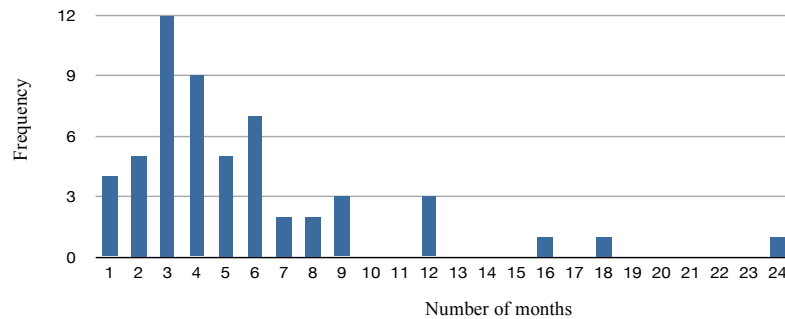
					Official time spent bootlegging	
Code	Positions	Primary Resp.	Industry	Freedom	No. Months project last underground	Percentage of work time used
1001	S	R&D	Health.	Because of the nature of their work	4	20
1002	S S	R&D	E. S. C.	Informally given	2	20
1003	M M	Pro Dev	IT	Because of the nature of their work	1	50
1004	S	Pro Dev	E. S. C.	Because of the nature of their work	6	10
1005	S	Research	Health	Informally given	18	20
1006	M M	Pro Dev	E. S. C.	Informally given	1	90
1007	M M	Pro Dev	E. S. C.	Don't have	3	20
1008	S S	Tech Dev	Health	Informally given	6	40
1009	M M	R&D	E. S. C.	A Percentage is given	2	20
1010	M M	Pro Dev	Health	Informally given	4	10
1011	S S	Pro Dev	E. S. C.	Don't have	3	5
1012	S	Pro Dev	E. S. C.	Informally given	3	30
1013	S S	Pro Dev	Health	Don't have	4	5
1014	S S	Pro Dev	Health	Because of the nature of their work	4	60
1015	M M	Pro Dev	E. S. C.	Because of the nature of their work	2	20
1016	S	R&D	IT	Informally given	4	40
1017	S	Pro Dev	IT	Don't have	3	20
1018	S	Research	Telecom	Informally given	3	20
1019	S	Research	IT	Formally given	5	10
1020	S	Research	E. S. C.	Formally given	1	25
1021	M M	Pro Dev	Health	Informally given	6	10
1022	S	Pro Dev	E. S. C.	Don't have	6	25
1023	S	Pro Dev	Telecom	Don't have	4	15
1024	S S	Pro Dev	Health	Informally given	5	40
1025	S	Pro Dev	E. S. C.	Don't have	3	10
1026	S S	Research	Telecom	Formally given	12	10
1027	M M	Pro Dev	Health	Don't have	9	20
1028	S S	Research	IT	Informally given	8	40
1029	S	Pro Dev	IT	Don't have	2	50
1030	S	Tech Dev	Telecom	Formally given	1	0
1031	S S	Research	IT	Because of the nature of their work	7	50
1032	S	Pro Dev	Health	Don't have	5	20
1033	M M	Pro Dev	Health	Informally given	5	30
1034	S S	Pro Dev	IT	Informally given	6	40
1035	S	R&D	Health	Informally given	4	20
1036	M M	R&D	E. S. C.	Because of the nature of their work	9	20
1037	S	R&D	IT	Because of the nature of their work	3	10
1038	S	R&D	IT	Because of the nature of their work	4	10
1039	S S	Pro Dev	IT	Informally given	12	30
1040	M M	Research	Telecom	Informally given	9	20
1041	S	Pro Dev	E. S. C.	Because of the nature of their work	3	10
1042	S	Research	Telecom	Formally given	2	40
1043	S	R&D	IT	Formally given	4	25
1044	M M	Research	Telecom	Formally given	24	30
1045	S	Research	Telecom	A Percentage is given	16	20
1046	S	Tech Dev	Telecom	A Percentage is given	3	40
1047	S S	Research	IT	A Percentage is given	6	30
1048	S	Pro Dev	E. S. C.	Because of the nature of their work	3	10
1049	S S	Research	Telecom	Formally given	8	30
1050	S S	Research	Telecom	Informally given	6	25
1051	S	R&D	IT	Informally given	3	20
1052	S	Pro Dev	IT	Informally given	3	10
1053	S S	Research	IT	Formally given	5	50
1054	M M	R&D	Telecom	Informally given	12	30
1055	S	Research	E. S. C.	Informally given	7	30

Table 6.2: Time spent on 55 bootleg projects discussed in details

Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

As is clear from Figure 6.1, the majority of bootleg projects lasted between 1 to 9 months underground. There are five exceptions which took between one to two years. The majority of interviewees spends 50% or fewer of their work hours on the bootleg

projects discussed in details. Table 6.3 compares these average values for different groups of interviewees based on their primary responsibility and their positions.

Figure 6.2: Distribution of percentage of work hour spent on bootleg projects
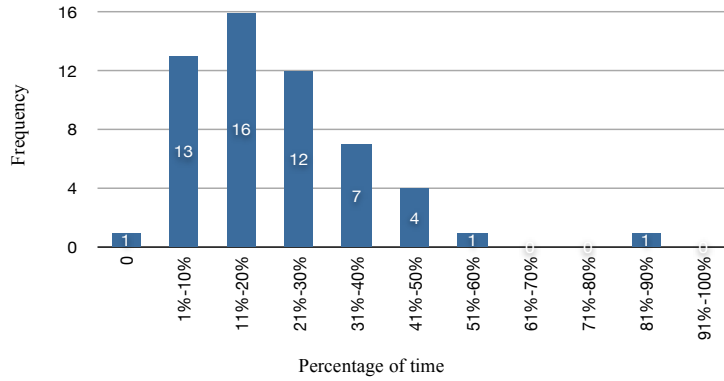
Table 6.3: Average values of time spent on bootlegging by different groups of interviewees

	Different groups	Average of months bootleg projects lasted underground	Average of Percentage of work hours spent on bootlegging
Primary responsibility	Product Development	4.2	25.6%
	R&D	4.6	21.4%
	Technology Development	4.5	40%
	Research	8.6	28%
Position	Staff	4.7	21.5%
	Senior Staff	6.2	31.7%
	Middle Manager	6.7	28.5%
Average for all interviewees together		5.5	26%

Key: to calculate this averages, the interviewee 1030 who claim he did not to spend organisation time for bootlegging was excluded.

Looking at averages of months that bootleg projects last for interviewees whose primary responsibilities are product development, R&D, technology development, and research[98] shows a clear distinction between those who focus on research from other responsibilities. The average from those focused on product development, R&D,

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[98] In this research, the primary responsibilities of interviewees which have been presented in chapter 4 show the nature of their work and the unit they work in. This is based on what has been highlighted by the interviewees as the responsibility of their unit.

technology development is less than 5 months which means it is lower than the average value for all interviewees. Whereas, the average for those who focus on research is over 8 months. This means that people who work in research units normally undertake longer lasting bootleg projects than those who focus on technology development, R&D and product development.

As is shown in Table 6.3, the average number of months spent on bootleg projects for staff is 4.6 whereas the average value for senior staff and middle manager is over 6 months. This implies senior staff and middle manager may undertake longer lasting bootleg projects than staff[99].

In terms of percentage of work hours spent on bootlegging – excluding interviewee 1030[100] – interviewees spent 26 percent of their time bootlegging. However the average value for technology development and research employees is way higher than the average value for product development and R&D employees, as is clear from Table 6.3. In addition, on average, senior staff and middle manager spent a higher percentage their working hours on bootlegging in comparison to staff. The highest average of percentage of work time spent on bootlegging was that of senior staff, which is over 31%.

Apart from the general discussion on average values and categorizing different groups, it is important to highlight that this research observes some of the exceptions that spent significant amounts of time on their projects. This research is able to present an explanation of these exceptions.

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[99] It might be argued that capabilities of this research to draw such conclusions is limited as its sample is quite small. Lets bear in mind that this research is not a positivist research and generalization of findings is not the main purpose of this research.

[100] This interviewee claimed that he did not use any organization time to bootleg and he developed his bootleg project in his own time outside his organisation.

One of these exceptions is interviewee 1006 who spent 90% of his bootlegging. It was discussed with him how it was possible for him to do so. He is a middle manager who was in charge of two experienced engineers. He gave them some of his official task to do for him. He spent the 90% of his work hours (e.g 9am – 5pm) bootlegging for only a month when his team had recently delivered a new product to the market and so they were not busy at the time and there was no deadline to meet. So by getting some help from those who work with him, he was able to spend more time on the bootleg project. Another project that took a significant percentage of the interviewee's time was pursued by interviewee 1014 who spent 60% of his time bootlegging. He was not only in a unique position in terms of having a significant reputation and experience in the organisation and good record of innovation that created more autonomy for him, he was also invited to work on skunk work types of projects on an open-end problem which no one had any solution for. Thus he was given more freedom to be able to come up with a solution and he used this freedom to spend extra time on his idea for a while.

In terms of longer lasting bootleg projects, there are three projects that lasted over one year. The longest lasting underground project discussed by interviewees was pursued by the interviewee 1044 who was a middle manager. He was also in charge of three other engineers, but more importantly it can be inferred that he was working on this project off and on. Although he mentioned that he spent 30% of his time bootlegging, he mentioned that this was not constant and he often spent more and sometimes less time on it. He strongly believed in the idea and tried to make it work. The second longest lasting bootleg project was pursued by a senior researcher. Although he was working in healthcare industry his work was more around an electronic device. There are two points that help him to pursue the project this long, first having a skunk works type of project gave him freedom to spent more time on his project and also in the middle of period he

gained his direct manager's support. There is another project pursued by interviewee 1045 who was staff in a research lab. In his case he was taking advantage of being able to spend a percentage of his time to work on his own project while he was trying to hide it from the decision makers.

The final issue that must be discussed at the end of this section is that data presented in this section is subject to bias[101]. Having said that, since bootlegging is a clandestine activity and generally in most of the cases interviewees themselves are in charge of managing their time, there is no better method of getting estimations of time spent on bootlegging other than directly asking the interviewees after gaining their trust. Therefore, considering the limitations of this research, it must be mentioned that even after implementing this research, it still seems to be the most feasible way of collecting some information about sensitive and clandestine activities such as bootlegging.

6.3.1. Summary time spent on bootlegging

On average bootleg projects lasted just over 5 months and interviewees on average spent 26% of their work time on the bootleg projects discussed, excluding interviewee 1030 who did not used any organisation time. The majority of these projects lasted between 1 to 9 months. Interviewees who work in research units, on average, pursued longer lasting

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[101] First, if the bootlegger does not achieve a satisfactory result at first, the project might be put on hold for a while and then he/she might go back to work on it. Such open-ended projects are problematic because of the difficulties of maintaining secrecy and momentum over a prolonged period. Second, the values presented here is based on interviewees' claims which may be subject to exaggeration, which means that they may overrate or underestimate the amount of time they spent on bootleg projects. It must be also mentioned that no one kept an exact record of the time they spent on bootleg projects. Some of the interviewees had a hard time giving the interviewer an estimation of percentage of their time they spent on bootlegging.

projects than interviewees who work in other units. Besides projects pursued by middle manager and senior staff lasted longer underground than projects pursued by ordinary staff.

The majority of interviewees spent 50% or fewer of their work hours on the bootleg projects discussed in details. Senior staff and middle managers spent a higher percentage of their work time on bootleg projects in comparison to normal staff.

6.4. Resources

The primary focus of this section is to show how interviewees acquire the resources they need for the bootleg projects under discussion. Thus, it first covers the resources they required. Then, it discusses extensively how they acquired these resources. In addition, interviewees were asked to give an estimation of the cost of their bootleg projects from an organisational perspective. The findings in this regard are presented in Appendix VII.

6.4.1. Required resources

In terms of resources required for bootlegging, this research specifically investigates types of resources required, methods of acquiring resources for bootlegging and estimated value of resources used[102].

First of all, the resources mainly needed to pursue research projects are normally machinery, equipment, and raw materials that are available in their labs. Often interviewees need some resources that do not exist in their laboratory, so they need financial resources to purchase materials, software, equipment, special technology, etc. This was only the case for seven interviewees[103]. If they need financial resources, it normally puts them under pressure as they generally do not have access to extra budgets such as "*blue sky budget*". As was mentioned before, this type of budget that is normally used for unforeseen projects that may suddenly emerge, either does not exist or interviewees normally have no direct access to them. If such budgets exist and

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[102] The value of used resources is presented in Appendix VII.

[103] In order to maintain the secrecy of discussion, it will not be specified in the thesis which interviewees needed financial resources. However Appendix VII explains that some of the middle managers and senior staff who were interviewed might be able to acquire funding for their bootleg projects

interviewees need to use them, they have to approach those who have access to this type

budget and convince them to get some resources.

6.4.2. Methods of acquiring resources

Table 6.4 primarily shows interviewees' methods of gathering required resources for

bootleg projects. This table also illustrates that 14 interviewees described working on

projects which needed no resources to begin with, but where this became an issue as the

project developed[104]. This was often because the initial stages of these projects were

computer-based tasks such as design, developing algorithms, writing software, etc. For

example:

> "*In my case it was just my time… didn't need any resources … I needed to sit*
>
> *down in front of the machine and do a bunch of testing to understand the*
>
> *software which somebody else wrote. So the vast majority of the project was*
>
> *understanding the software both how it worked and how it was documented.*"
>
> (1011, Senior Staff, Product Development)

When interviewees need resources to pursue their bootleg projects, as is presented in

Table 6.4, the main source is the slack resources[105] available in their laboratory and work

environment. This was raised by 33 interviewees: as is shown in following comments:

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[104] As is shown in Table 6.4, eight out of these 14 interviewees when they made progress with their
bootleg projects needed to get some resources. Then they used the same methods that are used by others to
acquire resources.

[105] The slack resources refer to raw material, machinery, equipment that already exists in their lab and they
are not tied into any special project. It must be highlighted that slack resources exclude any financial
resources.

Table 6.4: Methods of acquiring resources for the discussed bootleg projects

Code	Positions	Primary Responsibilities	Industry	No significant resources required	Slack resources*	Access to special budget	Resources assigned to official projects	Asking colleagues	Asking direct manager
1001	S	R&D	Health.	✓					✓
1002	S S	R&D	E. S. C.		✓			✓	
1003	M M	Pro Dev	IT		✓				
1004	S	Pro Dev	E. S. C.		✓				✓
1005	S	Research	Health	✓					✓
1006	M M	Pro Dev	E. S. C.				✓		
1007	M M	Pro Dev	E. S. C.		✓				
1008	S S	Tech Dev	Health		✓		✓		✓
1009	M M	R&D	E. S. C.		✓	✓			
1010	M M	Pro Dev	Health				✓		
1011	S S	Pro Dev	E. S. C.	✓					
1012	S	Pro Dev	E. S. C.	✓					
1013	S S	Pro Dev	Health		✓				
1014	S S	Pro Dev	Health		✓		✓		
1015	M M	Pro Dev	E. S. C.				✓		
1016	S	R&D	IT	✓			✓		
1017	S	Pro Dev	IT	✓					
1018	S	Research	Telecom	✓					
1019	S	Research	IT		✓				
1020	S	Research	E. S. C.	✓	✓				
1021	M M	Pro Dev	Health		✓	✓			
1022	S	Pro Dev	E. S. C.		✓		✓		
1023	S	Pro Dev	Telecom		✓				
1024	S S	Pro Dev	Health				✓		
1025	S	Pro Dev	E. S. C.		✓				
1026	S S	Research	Telecom	✓	✓				
1027	M M	Pro Dev	Health		✓		✓		
1028	S S	Research	IT	✓					
1029	S	Pro Dev	IT	✓					
1030	S	Tech Dev	Telecom	✓					
1031	S S	Research	IT		✓				
1032	S	Pro Dev	Health		✓				
1033	M M	Pro Dev	Health				✓		
1034	S S	Pro Dev	IT		✓			✓	
1035	S	R&D	Health		✓				
1036	M M	R&D	E. S. C.		✓	✓			
1037	S	R&D	IT		✓				
1038	S	R&D	IT		✓				
1039	S S	Pro Dev	IT		✓				✓
1040	M M	Research	Telecom				✓	✓	
1041	S	Pro Dev	E. S. C.		✓				
1042	S	Research	Telecom	✓					
1043	S	R&D	IT		✓				
1044	M M	Research	Telecom				✓		
1045	S	Research	Telecom		✓				
1046	S	Tech Dev	Telecom		✓		✓		
1047	S S	Research	IT		✓				
1048	S	Pro Dev	E. S. C.				✓		
1049	S S	Research	Telecom				✓		
1050	S S	Research	Telecom		✓		✓		
1051	S	R&D	IT		✓				
1052	S	Pro Dev	IT	✓					✓
1053	S S	Research	IT		✓				
1054	M M	R&D	Telecom						
1055	S	Research	E. S. C.		✓				

Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

* Slack resources are resources that are available in the organisation but they are not assigned to any particular projects although they are available to be used for formal projects. Whereas, by official projects resources, this research means that these resources are specifically assigned to a particular project.

"...and so there is an existing tools shop which pretty much designers and engineers use. So if we need to test an idea, it's a combination of modifying some existing products or being able to put things together just to test up the basic concept, we use them… So the machine and machine shop were already there."

(1002, Senior Staff, R&D)

The second most important source that is used by the interviewees to gather required resources for their bootleg projects are the resources[106] that are available. This method often coincides with using of slack resources. 16 interviewees admitted that they used resources assigned to official resources or have charged their bootleg projects' costs to official projects. They often mix their bootleg projects with official projects in order to use resources assigned to official projects.

"I used the same materials ... [which] I was supposed to use for doing other projects and then I borrowed equipment from another colleague ... I sort of steal resources and I used resources from other departments." (1040)

"I model it to see if it works and then what I usually do is because I don't have funding for it directly, I combine it with another project and try to use same material from another project to get started." (1049)

Another way of acquiring resources is to approach those colleagues who have access to the required resources and take them on board. Four interviewees used this method.

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[106] Normally resources assigned to other projects include equipment, material (e.g. raw materials), machinery, etc. However, if the interviewees have access to financial resources assigned to official projects and they need them, they will use them. The issue that must be highlighted is that the main discussions with interviewees were more around resources excluding financial ones. As was discussed in the previous section, interviewees also use time assigned to official projects for bootlegging.

> "… *In order to get that data you have to convince the lead engineer that your*
>
> *idea is worth investing silicon wafers in. They have allotment for experiments*…"
>
> (1034, Senior Staff, Product Development).

Another method of gathering required resources is to apply to their direct managers who have access to the resources, e.g. financial resources or materials, which are needed. This issue was raised by 6 interviewees as the method of getting required resources.

> "… *then, I discussed the idea with* … [my boss] *because he had access to the*
>
> *material and instrument I needed*." (1039, Senior Staff, Product Development)

Approaching the direct manager at this stage cannot be considered to be revealing the bootleg project as their direct manager is not the decision maker and after approaching him/her the bootlegger continues to pursue the project unofficially. Later in this chapter, this will be discussed further.

The final method of gathering resources is a method used specifically by three interviewees who are middle manager, i.e. 1009, 1021 and 1036[107]. This was because they have direct access to extra funding that was allocated in their organisation for projects that emerged and were not funded from a periodic budget. These fundings were also called "*blue sky funds*" or "*flush funds*". These specific interviewees, since they have access to this type of resources, used them for pursuing their bootleg projects.

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[107] In sub-section 4.4.6.4 of the Chapter 4, where the R&D budget and interviewees' access to special budgets were discussed, it was explained that there are three interviewees who have access to this type of budget and therefore they must be considered as exceptions.

6.4.3. Summary of resources

This section covers resources required for bootlegging and how they are acquired. It was discussed that 14 bootleg projects did not need any significant resources to begin with. When the resources become an issue, they were mainly limited to material, equipment, machineries, software, etc.

Slack resources available in interviewees' units and labs are the main source for acquiring resources. Other methods of gathering resources include using resources allocated to official projects and approaching colleagues and direct managers to ask for resources. There are only three interviewees who were able to use loose funding available in their units to support their bootleg projects. These interviewees were middle managers with unique access to financial resources. It is worth mentioning, as Appendix VII shows, that generally the cost of resources used for these bootleg projects is very little in comparison to the whole R&D expense.

6.5. Other Participants

So far, it has been discussed, in the previous section (6.4) that three interviewees approached their colleagues to get resources they needed. This subsection discusses other reasons for approaching colleagues and other participants to see how interviewees acquire the expertise, that is needed to progress with the project, and the support, needed to reveal the bootleg project to decision makers. One of the unique findings of this research is indeed that bootleggers approach other people to acquire the support they need, as well as resources and expertise, especially before revealing their project.

Table 6.5 shows the number of people whom the bootleggers approach, where they work and how they help with bootleg projects. This table suggests that interviewees – the person who initiates a bootleg project – approach their colleagues and often people from outside their organisations to acquire the expertise and resources needed for the project.

6.5.1. Projects pursued singlehandedly by interviewees

As is shown in this table, nine of the bootleg projects in the sample were pursued solely by the interviewees. This is mainly because they have the expertise and resources required to complete the initial stage of their projects clandestinely. Six out of these nine projects were pursued by interviewees who are ordinary staff[108]. Seven of them were pursued by interviewees whose focus was product development or R&D. Apart from these nine projects, the rest of the 46 projects were pursued by getting help from colleagues and outsiders.

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[108] Terms, such as "normal staff" or "ordinary staff", are used in this thesis to refer to interviewees who have staff positions. This does not include senior staff and middle managers.

Table 6.5: Other participants and their roles

Code	Positions	Primary Responsibilities	Industry	Origin of participants			Participants roles		
				Same unit	Other units or departments	Outside organisation	Support and technical advice	Direct work on the project	Provide resources
1001	S	R&D	Health.	1				1	
1002	S S	R&D	E. S. C.	1	1		1	1	1
1003	M M	Pro Dev	IT	4		1	1	4	
1004	S	Pro Dev	E. S. C.		1		1		
1005	S	Research	Health						
1006	M M	Pro Dev	E. S. C.	2			2		
1007	M M	Pro Dev	E. S. C.	1	1		1	1	
1008	S S	Tech Dev	Health	5		1	1	5	
1009	M M	R&D	E. S. C.	1				1	
1010	M M	Pro Dev	Health						
1011	S S	Pro Dev	E. S. C.		1		1		
1012	S	Pro Dev	E. S. C.	1	1		2		
1013	S S	Pro Dev	Health						
1014	S S	Pro Dev	Health	2	1		1	2	
1015	M M	Pro Dev	E. S. C.						
1016	S	R&D	IT			1	1		
1017	S	Pro Dev	IT	3			3		
1018	S	Research	Telecom	1			1		
1019	S	Research	IT	1			1		
1020	S	Research	E. S. C.	1		1	2		
1021	M M	Pro Dev	Health	3				3	
1022	S	Pro Dev	E. S. C.						
1023	S	Pro Dev	Telecom						
1024	S S	Pro Dev	Health	2			2		
1025	S	Pro Dev	E. S. C.	1	1		2		
1026	S S	Research	Telecom	2	2		4	2	
1027	M M	Pro Dev	Health	3				3	
1028	S S	Research	IT		1		1		
1029	S	Pro Dev	IT						
1030	S	Tech Dev	Telecom			2	2		
1031	S S	Research	IT	2			1	1	
1032	S	Pro Dev	Health	1			1		
1033	M M	Pro Dev	Health	2	2		2	2	
1034	S S	Pro Dev	IT	2	1		3		1
1035	S	R&D	Health	1	2		3		
1036	M M	R&D	E. S. C.	4				4	
1037	S	R&D	IT	1			1		
1038	S	R&D	IT						
1039	S S	Pro Dev	IT	2			1		1
1040	M M	Research	Telecom	2	1		1	2	
1041	S	Pro Dev	E. S. C.						
1042	S	Research	Telecom	1	1		2		
1043	S	R&D	IT	4			4		
1044	M M	Research	Telecom	4			2	2	
1045	S	Research	Telecom	2				2	
1046	S	Tech Dev	Telecom	3		1	3	1	
1047	S S	Research	IT	3			1	2	
1048	S	Pro Dev	E. S. C.			1	1		
1049	S S	Research	Telecom		3		2	1	
1050	S S	Research	Telecom	2			2		
1051	S	R&D	IT		1		1		
1052	S	Pro Dev	IT	1			1		
1053	S S	Research	IT	3			2	1	
1054	M M	R&D	Telecom	2	1		1	2	
1055	S	Research	E. S. C.	1			1		

Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

6.5.2. Projects pursued with help of others

The number of participants in projects initiated by middle managers and senior staff are relatively higher than the number of participants in projects initiated by ordinary staff. This is because senior staff and middle managers take advantage of the networks they have built over years and can contact a wider range of people for help. Therefore they are able to undertake relatively larger projects, which often need a wider range of expertise.

The majority of participants come from interviewees' units and they are close colleagues of the interviewee. In 22 of the projects the participants were all from the same unit as the main bootlegger. In 17 projects, bootleggers approached their colleagues from other departments, such as other R&D units, production or marketing departments. The following comments are common observations:

> "*I would negotiate with the group that is closest to me which is engineering and marketing. So I negotiate with both of them, I try to get them on board before I need to make a pitch to top management*" (1002, Senior Staff, Product Development)

> "*In this particular case, it was really just communication with the other department and with another engineer that would be involved in developing software…*" (1012, Staff, Product Development)

One potentially valuable source of help for the bootlegger is the marketing department. 11 bootleggers in the sample group approached marketing staff to either gather evidence to back their project or to enlist their support. On the other hand, in seven of the projects, participants came from outside the organisation, including scientists from universities, previous colleagues, customers and suppliers. For example:

> "*I started talking to customers to make sure that they agree with the direction*
>
> *and they would be asking for the product with this particular technology.*" (1046,
>
> Staff, Technology Development)

6.5.3. Participants' roles

The role played by these participants, in these 46 projects, are quite different. As is clear from table 6.5, the primary role played by participants is to giving advice to the bootlegger and to support the project when the bootlegger decides to reveal it – which is the case in 40 out of 46 projects. This is specially the role of those who come from other departments or outside the organisation.

Only in 21 projects, did participants spend time to work on the bootleg project; 10 of them were initiated by interviewees who were middle managers, 8 of them were projects pursued by senior staff. Thus only 3 of the normal staff had someone else participate in their bootleg project by working directly on them. This is because middle managers are normally in charge of a few staff[109] while senior staff may have one or two technicians; they can call on to help them with their bootleg projects, for instance:

> "*Like I said I had couple of technicians were really helpful. It seems that lower*
>
> *down you go on the ladder the people are more free to do this stuff oddly*
>
> *enough. I had two technicians who did an awful lot of work and then I also had*

---

[109] Section 4.5.2, in the Chapter 4, explained that middle manager are normally in charge of a few employees and when they initiate a bootleg project, they may have them work on it. This explains why first the number of participants in projects pursued by the middle manager is higher than number of participants in pursued by others and also why the number of participants who directly work on the bootleg projects are higher for projects pursued by middle manager in comparison to the number of participant who spend time working on bootleg projects that are pursued by other interviewees.

another engineer who was my peer in another project who was just staying quiet

and talking to me and looking over my shoulder and so forth." (1014, Senior

Staff, Product Development)

Bootleg projects initiated by normal R&D or product development staff are usually

projects pursued only by the interviewee. If there are any other participants, their role is

limited to the giving of advice or support. Finally, as mentioned in the previous sub-

section, in three of the projects participants provided the bootlegger with required

resources.

6.5.4. How participants are chosen

The final issue that must be addressed here is how bootleggers decide whom to

approach, considering the fact that the project is pursued clandestinely. Two criteria

came up with the interviewees. The first and the most important criterion is the project

needs; that can be implied from almost all the interviewees who mentioned that they had

approached other people to help them. Obviously, if they do not need someone's

expertise or resources, they will not discuss the project with him/her. The interviewees,

based on his/her experience, know who – inside or outside the organisation – has the

required expertise. The second important criterion is to have previous experience of

working together. They normally chose to work with people they had worked with

before, firstly because they want to be sure that the participant is capable of doing the

task and secondly because of the issue of trust. This is a common comment made by

interviewees:

"*My colleagues; with colleagues whose areas and expertise are complimentary*

to mine. So if the project for example needs several different sub-disciplines and

I only have expertise in one or two, then I would choose colleagues who have

expertise specifically in the other required areas." (1043, Staff, R&D)

6.5.5. Summary of other participants

Nine of 55 bootleg projects discussed in the sample were pursued singlehandedly by the interviewees – the majority of them were ordinary staff from R&D or product development units. The rest of discussed projects, 46, were pursued with the help of others.

The number of participants in projects initiated by middle manager and senior staff are relatively higher than the number of participants in projects initiated by ordinary staff. The majority of participants come from interviewees' units and they are close colleagues of the interviewee. In some cases, bootleggers approach their colleagues from other departments, such as other R&D units, production or marketing departments. In addition, outsider participants such as scientists from universities, previous colleagues, customers and suppliers may also be consulted.

The primary role played by participants is to giving advice to the bootlegger and supporting the project when the bootlegger decides to reveal it. Only in 21 projects, did participants spend time actually working on the bootleg project; these projects were mainly run by interviewees who are middle managers or senior staff. Interviewees choose whom to approach in order to get help, primarily based on the project needs, secondly based on previous experience of working together.

6.6. Bootlegging vs. Official Process

To have a better perception of bootlegging operation, it is important to take a look at two issues: first whether interviewees prefer bootlegging or official process, second the advantages and disadvantages (limitations) of bootlegging compared to official projects. These issues also help to understand why interviewees decide to reveal bootleg projects. Thus, the interviewees were questioned to specify their preference and the perceived advantages and disadvantages of bootlegging.

Table 6.6 shows interviewees preferences and the advantages of bootlegging. As is shown in this table, 25 out of 55 interviewees prefer to work on bootleg projects whereas 15 interviewees prefer to work on official projects. There are also 15 interviewees who prefer to work on a combination of official and bootleg projects.

One of the main advantages of bootlegging, highlighted by 27 interviewees, is its being a faster way of pursuing ideas mainly because they do not need to go through bureaucratic process of getting approval. Thus the early stages of developing an idea can quickly be completed. The following are common comments made by these interviewees:

"*Because we usually have management fads, from time to time, we go through formal process ... The amount of documentation and meetings that we go through really take a lot of my time. It is much better to have a kind of R&D projects that is kind of off the radar as opposed to something that is very structured and schedules and need to be done*." (1010, Middle Manager, Product Development)

"*It is a quick way to make an initial experiment and make progress with initial research activity*." (1037, Staff, R&D)

Table 6.6: Bootleg projects advantages over official projects

Code	Position	Primary responsibilities	Preference	No bureaucracy, faster than formal process	Autonomy, no limitation in direction	Interesting, exciting, creative & innovative	No interruption specially by management	No time limitation or pressure to have results
1001	S	R&D	Official			✓		
1002	S S	R&D	Both			✓		
1003	M M	Pro Dev	Official		✓			
1004	S	Pro Dev	Both			✓		
1005	S	Research	Official	✓				
1006	M M	Pro Dev	Official	✓				
1007	M M	Pro Dev	Bootlegging		✓	✓		
1008	S S	Tech Dev	Bootlegging	✓	✓	✓		
1009	M M	R&D	Bootlegging	✓				
1010	M M	Pro Dev	Both	✓		✓		✓
1011	S S	Pro Dev	Bootlegging	✓		✓		
1012	S	Pro Dev	Bootlegging	✓	✓		✓	
1013	S S	Pro Dev	Bootlegging		✓	✓		✓
1014	S S	Pro Dev	Bootlegging	✓	✓	✓		
1015	M M	Pro Dev	Official		✓			
1016	S	R&D	Both			✓		
1017	S	Pro Dev	Official		✓	✓		
1018	S	Research	Bootlegging	✓				✓
1019	S	Research	Both				✓	
1020	S	Research	Bootlegging	✓	✓		✓	
1021	M M	Pro Dev	Both	✓	✓			✓
1022	S	Pro Dev	Bootlegging	✓				
1023	S	Pro Dev	Official		✓		✓	
1024	S S	Pro Dev	Bootlegging	✓				
1025	S	Pro Dev	Both				✓	
1026	S S	Research	Both	✓				
1027	M M	Pro Dev	Official			✓		
1028	S S	Research	Both		✓	✓	✓	✓
1029	S	Pro Dev	Official				✓	
1030	S	Tech Dev	Bootlegging	✓				
1031	S S	Research	Both	✓			✓	
1032	S	Pro Dev	Official	✓				✓
1033	M M	Pro Dev	Bootlegging				✓	
1034	S S	Pro Dev	Bootlegging		✓			✓
1035	S	R&D	Both				✓	
1036	M M	R&D	Bootlegging	✓	✓			
1037	S	R&D	Official	✓				
1038	S	R&D	Bootlegging	✓	✓	✓		
1039	S S	Pro Dev	Bootlegging			✓		
1040	M M	Research	Official		✓			
1041	S	Pro Dev	Official			✓		
1042	S	Research	Both	✓		✓		
1043	S	R&D	Bootlegging				✓	
1044	M M	Research	Both	✓	✓			✓
1045	S	Research	Bootlegging		✓	✓		
1046	S	Tech Dev	Bootlegging			✓	✓	✓
1047	S S	Research	Official	✓			✓	✓
1048	S	Pro Dev	Bootlegging	✓	✓			
1049	S S	Research	Bootlegging		✓			
1050	S S	Research	Bootlegging	✓	✓	✓	✓	
1051	S	R&D	Both		✓	✓		
1052	S	Pro Dev	Both	✓			✓	
1053	S S	Research	Bootlegging			✓		
1054	M M	R&D	Bootlegging	✓		✓		
1055	S	Research	Official			✓	✓	

Key: S: Staff; **S S:** Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development

Another advantage of bootlegging is the freedom that bootleggers have to try different directions, technologies and methods that they do not normally test or experiment with. This was raised by 22 interviewees. Not only is the freedom valuable for them but also

because they are able to experiment with new directions and method, they often come up with fascinating results that benefit the organisation. Besides, since they experiment with new things, they also learn from this experience and gain knowledge and experience that they do not necessarily gain by pursuing official projects. For instance, a couple of interviewees mentioned:

> "*There is more freedom to explore different avenues to be a little more creative rather than in a very formal system where there are benchmarks so close together in times that there is no whole lot of chance*" (1007, Middle Manager, Product Development)

> "*You are free to change your mind and go to different directions without having to tell anyone and asking for permission*" (1048, Staff, Product Development)

The freedom they have also may result in another advantage of bootlegging which is being more exciting, interesting and often innovative - raised by 24 interviewees. There are several reasons for that which include: they seem to be more creative, innovative, and challenging than official projects and their subjects often match interviewees' interests and expertise. There is also a matter of the ownership feeling about them. Common observations are:

> "*It is interesting… it is more a challenge to prove that whatever you were trying to do is the correct decision… You can create a new product.*" (1038, Staff, R&D)

> "*It was a lot of fun. It changes things and the things are radically done. So you get really excited about that*" (1041, Staff, Product development)

Another benefit of bootlegging, emphasised by 16 interviewees, comes from the clandestine nature of these activities. Because bootlegging is hidden from the majority of

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the organisation and management, they would get less interruption especially from management, for example:

"*Because I feel like I got little bit more freedom to get my job done without much interference. I usually perform better. Working on my own and getting what I get done. When I come up with questions that I am sure which way to go, I don't need management interruption… As far as my concerns, more creative process can show itself. If it is more formal development process what can happen is usually the creative process can get squashed.*" (1028, Senior Staff, Research)

The final benefit of bootlegging highlighted by 10 interviewees is that they do not feel any pressure. Since the project is concealed, they are not under pressure to come up with results and they do not need to presents their results to anyone, especially management. Besides, they do not have any deadline to meet for bootleg projects which significantly reduces pressure for them and make them work more calmly on the project without feeling any pressure, for instance:

"*You don't have to commit to the benefit.*" (1034, Senior Staff, Product Development)

"*You have less pressure to deliver in a strict time frame*" (1044, Middle Manager, Research)

On the other hand, Table 6.7 illustrates disadvantages of bootlegging in comparison to official process highlighted by the interviewees. Interestingly, more disadvantages or limitations for bootlegging are raised by interviewees than advantages. First and most commonly cited disadvantage of bootlegging is lack of access to resources and limitations in gathering resources required to pursue bootleg projects was raised by 27

interviewees. No matter whether they were in favour of bootlegging or official process, it seems to be most common limitation they have when they operate underground.

"*Getting resources is one difficulty, asking people to help you is another one.*"

(1030, Staff, Technology Development)

The second important limitation of bootlegging is lack of managerial support which is highlighted by 15 interviewees. This could result in limitation in gathering resources, getting time, asking other people to help, implementing the project or idea, etc.

"*Well, the sense that you couldn't put day after day to it. It was sort of very limited time and not having the support of director. The director and even the president of the company, they were smart guys who sit and tech talk with you and you can learn a lot from it and get a lot of ideas. Even in terms of talking to colleague, if it was an official project, the colleague would have more time to sit and talk about it. When it's not an official project, ok they would talk but they only go so far.*" (1005, Staff, Research)

Another limitation is to convince managerial and marketing staff that the bootleg project is worth investing time and resources in and making them excited about the idea – stated by 14 interviewees. Whereas, for official projects, interviewees do not face these challenges. The following is a common observation:

"*Not getting buy-in from your organization. You would be in tough position if the project didn't get approval*" (1006, Middle Manager, Product Development)

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Table 6.7: Bootleg projects disadvantages in comparison to official projects

Code	Positions	Primary Responsibility	Resource limitation	Lack of managerial support	Managerial & marketing buy-in	Being responsible and taking risk	Takes longer, time limitation	Getting others' support & help	Wasting time & not having result if it fails	Lack of direction and impact, going loose
1001	S	R&D				✓			✓	
1002	S S	R&D	✓			✓				
1003	M M	Pro Dev					✓			
1004	S	Pro Dev	✓							
1005	S	Research	✓	✓			✓	✓		
1006	M M	Pro Dev		✓	✓	✓				
1007	M M	Pro Dev		✓		✓				
1008	S S	Tech Dev	✓							
1009	M M	R&D								
1010	M M	Pro Dev	✓	✓				✓		
1011	S S	Pro Dev		✓		✓	✓			
1012	S	Pro Dev							✓	
1013	S S	Pro Dev		✓	✓					
1014	S S	Pro Dev					✓			
1015	M M	Pro Dev					✓			
1016	S	R&D	✓	✓	✓					
1017	S	Pro Dev	✓		✓		✓			
1018	S	Research								✓
1019	S	Research								
1020	S	Research								✓
1021	M M	Pro Dev	✓	✓		✓	✓			
1022	S	Pro Dev				✓				✓
1023	S	Pro Dev	✓					✓		
1024	S S	Pro Dev	✓							
1025	S	Pro Dev				✓				
1026	S S	Research	✓	✓		✓		✓		
1027	M M	Pro Dev	✓	✓				✓		
1028	S S	Research			✓			✓		
1029	S	Pro Dev	✓		✓		✓			
1030	S	Tech Dev	✓			✓		✓		
1031	S S	Research	✓					✓		
1032	S	Pro Dev							✓	
1033	M M	Pro Dev	✓				✓			
1034	S S	Pro Dev				✓				
1035	S	R&D								✓
1036	M M	R&D							✓	
1037	S	R&D	✓	✓						
1038	S	R&D	✓					✓		
1039	S S	Pro Dev	✓		✓			✓		
1040	M M	Research			✓					
1041	S	Pro Dev	✓							
1042	S	Research	✓					✓	✓	
1043	S	R&D	✓				✓	✓		
1044	M M	Research	✓		✓					
1045	S	Research			✓					
1046	S	Tech Dev			✓					
1047	S S	Research	✓	✓						✓
1048	S	Pro Dev			✓				✓	
1049	S S	Research							✓	✓
1050	S S	Research	✓	✓			✓			
1051	S	R&D	✓		✓					
1052	S	Pro Dev		✓	✓					
1053	S S	Research		✓						
1054	M M	R&D								✓
1055	S	Research	✓			✓			✓	

Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development

Another challenge for interviewees when they pursue bootleg projects is that they feel somehow responsible. They feel obliged to benefit their organisation even though the project is hidden from management. Latter when they reveal their project, they also feel

responsible and often they undertake risk because if the project fails even after being revealed, it somehow seems to be their fault, at least in their own eyes. For instance, as is shown in the Table 6.7, another disadvantage of bootlegging which is also highlighted by 8 interviewees is the sense of wasting time and not having a result if the project fails, whereas they do not have a same concern if an official project fails. One interviewee mentioned:

"*The problem with work independently and unofficially is that there is an equal chance that project may fail as it may succeed. But being able to be given a project the responsibility is taken off your shoulders. That is no longer a decision that you have to think about. You have to proceed and do the best job you can*" (1002, Senior Staff, R&D)

Apart from early stages of pursuing the bootleg project which are normally faster than official projects – it seems that bootlegging becomes less efficient as interviewees make progress. In addition, bootleg projects are clandestine and so they are not prioritised. Thus interviewees can only work on them when they have no other priority or they find slack time. Besides, getting resources and expertise often is a challenge for them, so the project takes longer than if it was pursued officially when it comes to the later stages. For instance:

"*Competing priorities and lack of support and lack of time …*" (1050, Senior Staff, Research)

Another limitation which is highlighted by 11 interviewees is convincing other people to cooperate with them, acquiring expertise and getting help from others. Since the project is clandestine, they could not ask everyone for help. They are limited to their network and people whom they know well.

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"*Not having management support. Not being able to ask people for help. I have to be selective when I want to discuss the project with someone. Resources could be an issue from time to time.*" (1026, Senior Staff, Research)

The final disadvantage of bootlegging which is raised by seven interviewees is their concern about the direction of bootleg projects. While having no limitation was previously discussed as an advantage of bootlegging, this group of interviewees believe that not having direction is not necessarily a good thing. This is mainly because they may go in a direction where their work would not have any impact or they might start to operate loosely and their work become irrelevant to the organisation.

"*But all of direction of the project should still be guided by what motivates the company to fund it… In general I think informal working is kind of overrated in my view, because everybody needs a little direction. The direction certainly helps the company. Just letting people work on their own and do whatever they want doesn't really help. It might make the workers happy but it is not going to make money for the company.*" (1018, Staff, Research)

"*You are escaping the decision process and you are free to explore your options. But what you are missing is a critical and technical view on what you are doing.*" (1020, Staff, Research)

6.6.1. Summary of bootlegging vs. official process

In order to better understand how interviewees operate clandestinely to pursue their bootleg projects, they were also asked to compare bootlegging processes to official processes and to identify the pros and cons of bootlegging.

One of the advantages of bootlegging is being fast, at least at the early stages of pursuing an idea because interviewees do not face bureaucratic boundaries. They also have freedom to explore different directions that cannot be tried through official projects. They also would not face interruptions especially from management which makes the process more creative or innovative. For some interviewees' bootleg projects may be more interesting, exciting and/or innovative. Finally, the fact that they feel no pressure to come up with result is valuable for some interviewees.

On the other hand, there are some drawbacks which seem to be critical to interviewees and even motivate them to make their bootleg projects official. The two most important limitations of bootlegging is lack of resources and lack of managerial support. Besides, getting managerial and marketing buy-in is another difficulty for them. Being responsible and undertaking risks are also other drawback, so as soon as they could get this responsibility off their shoulders and share the risk with others, they would do so. Spending enough time and asking people to work with them on bootleg projects often becomes a problem for them, specially for ordinary staff. Some interviewees also highlighted that lack of direction might become a problem in pursuing bootleg projects.

6.7. Chapter Summary

To understand how bootleggers operate, this research set out to discover how bootleggers find the time, resources and expertise required to pursue bootleg projects. It also identified a fourth element, which becomes particularly crucial when bootleggers want to reveal their project: colleagues' support[110]. Figure 6.4 shows bootlegging requirements – time, resources, expertise and support – and methods or sources used by interviewees to acquire bootleg project needs.

First, almost all interviewees[111] work on their bootleg projects during working hours. They may stay extra hours and weekends at work in order to complete their official work and pursue their bootleg project. In general they mix their official work with their bootleg projects in order to hide them from management. However, the bootleg project must not be allowed to get in the way of official projects, as this can arouse management suspicions and put the bootlegger at risk. Slack time, specifically time between the end of one project and the beginning of the next, is a common source of time for bootleggers. Depending on the type of project they are pursuing, they may also work at home.

Interviewees may pursue their project clandestinely from a month to two years, for a few hours a day to a few days a week. On average, bootleg projects lasted over 5 months underground. This research found that senior staff and middle managers may undertake

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[110] The support required to pursue and then reveal bootleg projects are different from case to case. Often direct managers' support is required to reveal bootleg projects to decision makers, this is covered in the following chapter. Other times colleagues, especially senior colleagues, are needed, this is the case discussed in this chapter. There also a few cases in which interviewees need customers' or suppliers' support to go further with their bootleg projects.

[111] There is only one exception, interviewee 1030, which has been explained in the section.

long-lasting bootleg projects while normal R&D staff carry out relatively short-term projects[112]. Besides, the research findings show that those whose primary responsibility is to pursue research projects may also undertake longer-lasting bootleg projects while employees in product development and R&D carry out relatively short-term projects.

Figure 6.3: How bootleggers fulfill their needs
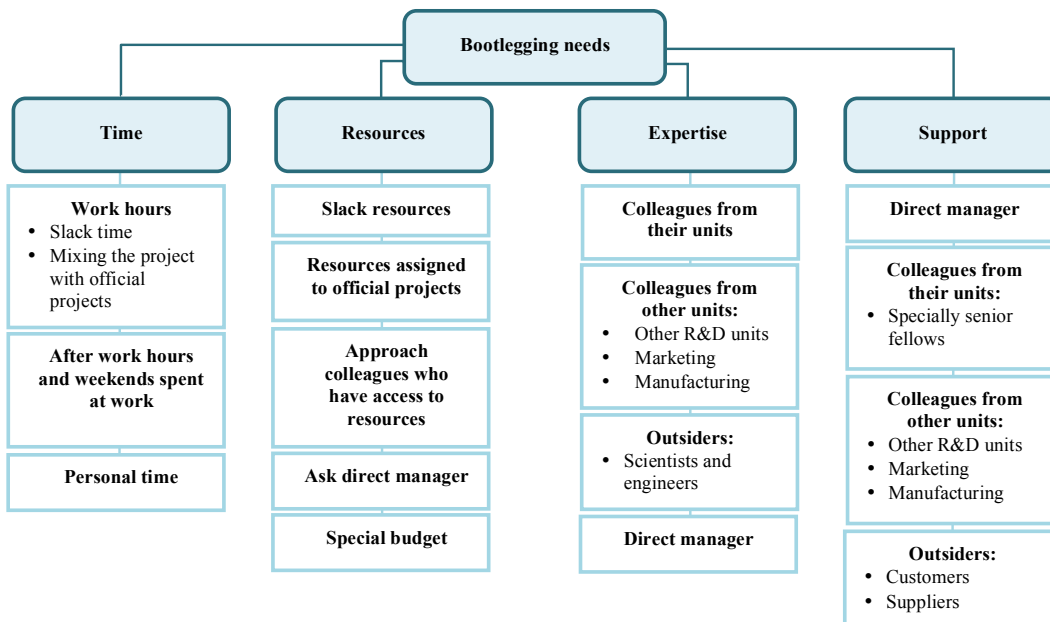
During this period, on average, interviewees spend 26% of their work time pursuing bootleg projects. The data also shows that this average is relatively higher among employees whose primary focus is research or technology development projects than employees who work in R&D or product development units. In addition, senior staff and middle manager also spend a higher percentage of their time on bootleg projects than ordinary staff do.

Bootleggers may not need significant resources at the early stage, specially when the bootlegger needs to work on more research oriented activities, computer software, or

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[112] It is not the purpose of this research to generalize its finding to all bootleggers.

algorithm development. However, when resources become an issue, slack resources –
raw materials, machinery and equipment that already exist in the facility but which are
not assigned to any special project – are their prime source. Interviewees may also use
resources assigned to official projects or charge their costs to official projects. Another
way of acquiring resources is to approach colleagues with access to the required
resources, or the direct manager. Using special budgets – such as "*blue sky budget*" –
was only used by a few interviewees. According to the interviewees, the cost of
resources used for bootleg projects during the underground process is very small in
comparison to R&D budgets[113]; this confirms Augsdorfer's (1996) findings.

Although there are bootleg projects that were pursued singlehandedly by the
interviewees, in most of the cases interviewees had to approach other people to get help
to acquire resources or expertise and their support to back up their project specially
when they want to reveal them. To get required expertise to develop the projects,
primarily interviewees approach their colleagues in their units or other units including
employees in other R&D units or manufacturing and marketing. The majority of these
participants' roles are limited to giving interviewees technical feedback and/or support.
They may also approach their friends who are engineers or scientists and experts in their
field who may work in other organisations or universities. Interviewees occasionally
approach their direct managers to get their project requirements (including technical
expertise), as is discussed in the next chapter.

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[113] Most of interviewees gave us an estimation of their bootleg projects costs for their organisation.
Comparing those numbers to the R&D budget of their organisations, the cost of bootleg projects are very
small. It must be borne in mind that this is only based on interviewees' judgement and there is no other
way to confirm that as bootleggers do not report or document their bootleg projects expenses.

The final requirement of bootleg projects is support in revealing their projects. This was neglected in previous research. The main source of support is the direct manager of interviewees; this will be expanded in the following chapter. Interviewees may also approach their colleagues in their units or from other units including marketing and manufacturing, specially their senior colleagues. If the support of outsiders such as customers and suppliers were required, interviewees would approach them to have them on board. Interviewees approach people within their personal network firstly according to the needs of the project, secondly based on their previous experience of working together, and thirdly if they have mutual trust.

Lastly, Advantages of bootlegging include: being fast at least at the early stages of pursuing an idea, having freedom to explore different directions that cannot be tried through official projects, no interruptions especially from management which makes the process more creative or innovative, being more interesting, exciting and/or innovative, feeling no pressure to come up with result is valuable. On the other hand, limitations of bootlegging comprise: lack of resources, lack of managerial support, getting managerial and marketing buy-in, being responsible and undertaking risks, spending enough time, asking people to help with bootleg project, and lack of direction.

CHAPTER 7:

BOOTLEGGING DISCLOSURE AND OUTCOMES

7.1. Introduction

This chapter focusses on the third and fourth research questions. To answer the third research question – what are the factors which cause bootleggers to reveal their clandestine projects? – this research investigates when and how interviewees reveal their bootleg projects and what elements influence their decision.

This chapter also addresses the fourth research question; i.e. what are the tangible and intangible outcomes of bootlegging? In order to answer this question, this research primarily focusses on the bootleg projects discussed in detail and their results. As was explained in the summary of the literature review chapter (2), the disagreement on the type of innovation resulting from bootlegging in the literature raises the importance of this research question. However in order to investigate bootlegging outcomes thoroughly, the result of bootleg projects that do not directly result in innovation or which fail and never get disclosed are also considered. Although this chapter focusses on the result of bootleg projects discussed in detail with interviewees, Appendix VIII presents the outcomes of bootleg projects pursued by interviewees within last two years prior to the interview. The findings of studying bootleg projects pursued by interviewees in last two years – presented in Appendix VIII – strongly support the discussion presented in this chapter based on outcomes of the bootleg projects discussed in detail.

7.1.1. Layout of this chapter

The following section (7.2) of this chapter focusses on the disclosure stage of bootlegging. This second section initially explains how bootlegging is normally revealed in two steps and outlines the elements that influence interviewees' decisions at each step. This section also explains exceptional circumstances in which the first step does not

occur or merges into the second step. The third section (7.3) covers bootleg projects that were not revealed to the decision makers and therefore to the organisation. The next section (7.4) addresses bootlegging outcomes discussing the outcomes of 55 bootleg projects presented in detail. This section primarily tries to specify the types of innovation that result from bootlegging. Then it continues by discussing the outcomes of bootleg projects that did not directly result in innovation. Finally, the chapter concludes in the fifth section (7.5) with a summary of the discussion presented in this chapter, specifically it includes a conceptual model that shows the elements that influenced interviewees' decisions to disclose their bootleg projects.

7.2. Disclosed Bootleg Projects

One of the early issues that caught the researcher's attention during the data collection process was that not all bootleg projects are revealed to the organisation and specifically to decision makers. This section focusses on the bootleg projects discussed in detail – 49 out of 55 – that were revealed to the decision makers; discussing the disclosure process and stages in which these bootleg projects were revealed.

This research discovered that the majority of these bootleg projects – 42 out of 49 – were revealed in two steps, as is shown in Figure 7.1.

- The first step – which is called transition from true bootlegging to quasi bootlegging in this paper – is when a bootlegger approaches his/her direct manager for a variety of reasons – as discussed in the previous chapter. The interviewees do not approach their direct manager to get official approval for their projects at this stage, mainly because their direct managers are not normally the decision makers who can approve or reject projects – as explained in the fourth chapter (section 4.4). The next subsection (7.2.1) discusses the first step taken by the interviewees to disclose their ideas.

- The second step – which is in fact the main stage of disclosure – is when the interviewees present or submit their projects to the decision makers to get official approval. This step is explained in subsection 7.2.2.

Figure 7.1: Two steps of revealing bootleg projects

Step I:
Discussing the project with the direct manager (Transition from true bootlegging to quasi-bootlegging)

Step II:
Presenting or officially submitting the project to the decision makers (The main step in disclosing bootlegging)
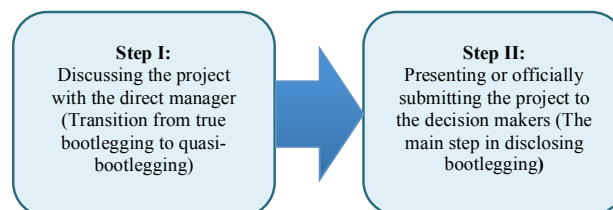
Obviously, not all bootleg projects go through the same process. There are two types of exceptions to the scenario explained above:

- First, situations in which the decision maker is in fact the interviewees' direct manager (1001, 1012, 1015, 1020).

- Second, situations in which the interviewee does not have a good relationship with his/her direct manager (1022, 1027, 1041).

The subsection 7.2.3 covers these bootleg projects, which are considered as exceptions since the first step merges into the second step or it does not occur.

7.2.1. First step: approaching the direct manager

This crucial step has been ignored in other papers on bootlegging. In this research, this stage has been identified as the transition from true bootlegging to quasi-bootlegging[114]. This is the first step toward revealing the bootleg project[115]; from this point on the direct

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[114] In Chapter 4, Section 4.7 presents a variety of bootleg projects including quasi-bootlegging as bootleg projects initiated by employees which are hidden from most of the organisation. However the bootleggers may discuss them with their direct manager, not to get permission to work on them, but to acquire the manager's opinion or support. The research found three such bootleg projects, discussed in detail by the interviewees, as quasi-bootlegging – projects pursued by interviewees 1008, 1010 and 1011. This perfectly matches the argument presented in this section. In these three projects, the direct manager of the interviewee was consulted at very early stages of bootlegging. So the transition from true-bootlegging to quasi-bootlegging happened at the beginning of the bootleg project. Let's bear in mind that this is done in order to have the direct manager on board for the reasons explained in this chapter, not to get permission to pursue the projects.

[115] The process of discussing the bootleg project with the direct manager is normally an informal discussion or a friendly chat to let him know that this project is going on and get the requirements needed to continue working on the project.

manager can crucially influence the progress of the project[116]. To understand the element that influences interviewees' decisions to approach their direct manager, we need to discuss why interviewees approach their direct managers and the roles that direct managers play in helping interviewees and their bootleg projects. It must be highlighted that approaching the direct manager is not the full disclosure of bootlegging because interviewees continue working clandestinely on their bootleg project after discussing them with their direct manager. In fact, the previous chapter (Chapter 6) discusses how interviewees approach their direct managers to fulfil their bootleg projects' needs, in order to be able to continue operating clandestinely. This section looks at this issue from a different perspective to highlight elements that push interviewees towards their direct mangers.

Table 7.1 illustrates the quality of interviewees' relationship with their direct manager[117] and the roles played by the direct managers – in other words, the reasons interviewees approach their direct managers as the first step – in these 42 cases. Elements that influence interviewees, pushing them toward their direct managers, are separately explained in following sub-sections (7.2.1.1. to 7.2.1.7). Before discussing these elements, let's bear in mind that the direct managers of the interviewees shown in Table 7.1 are not the decision makers and the interviewees do not approach them to get approval or permission to work on their ideas.

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[116] Data show that the direct managers of bootleggers play a significant role in bootlegging when they are consulted about bootleg projects, specially when the bootleg projects fall into the area of the direct manager's expertise.

[117] The quality of interviewees' relationships with their direct managers is thoroughly discussed in Section 4.6.2 in the chapter four and presented in Table 4.4.

Table 7.1: Role played by the direct manager

Code	Positions	Primary Responsibility	Relationship with direct manager *	Reasons to approach the direct manager (elements that push interviewees to their direct managers)						
				Maintaining good relation with direct manager	Getting freedom	Acquiring resources	Consulting about technical aspects of project	Protecting project from interruption	Having direct manager to back up project	Presenting project to decision makers
1002	Senior Staff	R&D	Good			✓			✓	
1003	Middle Manager	Pro Dev	Good						✓	
1004	Staff	Pro Dev	Good			✓			✓	
1005	Staff	Research	Good	✓		✓	✓			
1006	Middle Manager	Pro Dev	Good						✓	
1007	Middle Manager	Pro Dev	Good	✓			✓			
1008	Senior Staff	Tech Dev	Great		✓	✓	✓	✓		✓
1009	Middle Manager	R&D	Good		✓				✓	
1010	Middle Manager	Pro Dev	Great		✓			✓	✓	
1011	Senior Staff	Pro Dev	Great		✓				✓	
1013	Senior Staff	Pro Dev	Good	✓	✓					
1014	Senior Staff	Pro Dev	Great							✓
1016	Staff	R&D	Good	✓	✓	✓				
1017	Staff	Pro Dev	Great		✓		✓	✓		✓
1021	Middle Manager	Pro Dev	Good							✓
1023	Staff	Pro Dev	Good	✓	✓					
1024	Senior Staff	Pro Dev	Great		✓	✓		✓		✓
1025	Staff	Pro Dev	Good		✓				✓	
1026	Senior Staff	Research	Good						✓	
1028	Senior Staff	Research	Good					✓	✓	✓
1029	Staff	Pro Dev	Good		✓					✓
1031	Senior Staff	Research	Good		✓				✓	
1032	Staff	Pro Dev	Good	✓	✓					✓
1033	Middle Manager	Pro Dev	Good				✓			
1034	Senior Staff	Pro Dev	Great	✓					✓	
1035	Staff	R&D	Good	✓	✓					
1036	Middle Manager	R&D	Good						✓	
1037	Staff	R&D	Good		✓					
1038	Staff	R&D	Good		✓				✓	
1039	Senior Staff	Pro Dev	Good	✓		✓				
1040	Middle Manager	Research	Good						✓	✓
1043	Staff	R&D	Good	✓						
1044	Middle Manager	Research	Good					✓	✓	
1045	Staff	Research	Good	✓					✓	
1046	Staff	Tech Dev	Good						✓	
1048	Staff	Pro Dev	Great		✓		✓		✓	✓
1049	Senior Staff	Research	Good							✓
1051	Staff	R&D	Good	✓					✓	
1052	Staff	Pro Dev	Good			✓				✓
1053	Senior Staff	Research	Great				✓		✓	
1054	Middle Manager	R&D	Good	✓						
1055	Staff	Research	Good				✓		✓	✓

Key: Pro Dev: Product Development; **Tech Dev**: Technology Development
* The quality of interviewees' relationship with their direct manager has been defined and presented in Table 4.4 in chapter four.
Column four and fifth of this table are borrowed from Table 4.4.

7.2.1.1. Maintaining a good relationship with one's direct manager

First of all, in all cases shown in Table 7.1 interviewees have a good or great relationship with their manager which is based on trust and mutual understanding. It is important to 13 of these interviewees to maintain their good relationship and mutual

trust with their direct managers. With this in mind, they inform their direct manager of the bootleg project before presenting it to the decision maker in order to avoid appearing as if they are going behind the manager's back, as an interviewee mentioned:

"*We were almost done with our primary experiment and we wanted him to know because we didn't want him to feel that we went behind his back. We wanted him on board so he would back us up once we submitted it online. And that was in fact the case ... once we told him, he helped us to do some tests.*" (1032, Staff, Product Development)

7.2.1.2. Getting freedom

17 interviewees approached their direct managers to get more freedom to be able to spend more time on the project in order to make progress before presenting it to the decision makers. For example:

"*In a weekly meeting, I might have mentioned that I spent some times on ideas that would be first place that he [the direct manager] heard about it and then after that I would say I am making a lot of progress ... My boss said why if you think it is going to work, why don't you spend a few weeks on it and see what you come up with.*" (1009, Middle Manager, R&D)

7.2.1.3. Acquiring resources

Another reason for approaching the direct managers given by eight interviewees was to acquire resources to pursue their project further prior to acquiring official approval[118]. For instance:

> "*I continue to pursue it and then we had a new director [new direct manager] and then my idea had been developed and ... Two or three times a week; we'd stand in the hallway and talk and share ideas. That was when I told him... I wanted company resources. I wanted to do an experiment. He thought it was feasible and a very good idea to pursue. He didn't want me to spend 100% of my time on it. He thought it was one of the projects that I could do on the side.*"
>
> (1005, Staff, Research)

7.2.1.4. Consulting about technical issues

In addition, nine interviewees approached their direct managers to seek technical advice. This is the case when the bootleg project falls into the area of the direct manager's expertise. For instance, the following comment specifies technical contributions of the direct manager of the interviewee.

> "*His comments are the most valuable to my work… He gave me some Technical hints that helped me to ...*"   (1053, Senior Staff, Research)

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[118] In previous chapter, Section 6.3 discussed that six interviewees approached their direct managers to get the resources they required. Here two more interviewees mentioned that their direct manager played the role of providing resources for bootleg projects.

7.2.1.5. Protecting the project from interruption

Another issue that seems to influence interviewees' approach to the direct managers is the role they play in protecting the bootleg project from senior managements' (e.g. decision makers') interruptions. They shield the bootleggers and help to maintain the secrecy of the project. The following comment highlights this issue:

> "*There is lot of time that the second hand impression I get is that my boss hasn't passed on these things to anybody else. He told me in some cases explicitly that he is going to leave other people out of it ... There are people who would shoot things down. This project ended up in about two and half months and we just did it sort of in the background. He knew that he wouldn't get approval for us to spend about two and half month spend on it. But he thought it was worth doing.*"
>
> (1017, Staff, Product Development)

7.2.1.6. Having direct manager to back up the project

The most common reason to approach the direct manager, highlighted by 22 interviewees, is to have him/her support the bootleg project, specifically back it up when it is the time to present it to decision makers[119].

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[119] The direct manager backing the project seems to be very valuable for some bootleggers, particularly when they are revealing bootleg projects to the decision makers. After the interviewees, the direct manager has probably the greatest influence on the decision to reveal the bootleg project. In some cases, the direct manager recommended the bootlegger to postpone disclosure in order to have more time to develop the project further or to find an appropriate occasion for disclosure in order to increase the chance of being accepted by the decision makers (stated by three interviewees). In another case, the direct manager helped an interviewee to share the risk of the project with his manager. Thus if the project were to fail, he alone would not be blamed.

"It's all about who's supporting you… I had him [my boss] *talk to his boss first and he also talked to ...*[another decision maker]*… then, a few days later, I was invited to a meeting with ...*[the decision makers] *to present ...*[my idea]*"* (1031, Senior Staff, Research)

7.2.1.7. Presenting the idea to decision makers via one's direct manager

Finally, in 13 cases, interviewees approached their direct managers to have them present the project to the decision makers. This is done because they managed to excite the direct manager about the project or/and because it is the direct manager's responsibility to communicate with the decision makers. For example:

"I informally discussed it with ... [my direct manager] *but not formally. The formal process is through my boss. He is in charge of communicating with the VP."* (1048, Staff, Product Development)

Consequently, the above are seven reasons why these 42 interviewees took the first step to disclosing bootleg projects by approaching their direct managers. These issues can be considered as the elements that push these interviewees to approach their direct managers.

7.2.2. The second step: disclosure to the decision makers

For 42 bootleg projects, the second step – which is also the main step – of disclosing bootleg projects is to present the project to decision makers in order to get official approval, as is shown in Table 7.2. While the first step – informing the direct manager of the bootleg projects – is normally informal (such as during a chat in the hallway), this step – presenting the bootleg project to the decision makers – is usually a formal

process[120]. To find out the elements that influence interviewees' decisions to present their ideas to decision makers, it is crucial to discuss this reason behind revealing bootlegging and interviewees' considerations for disclosing bootlegging.

Figure 7.2: The second and the main step toward disclosing bootlegging
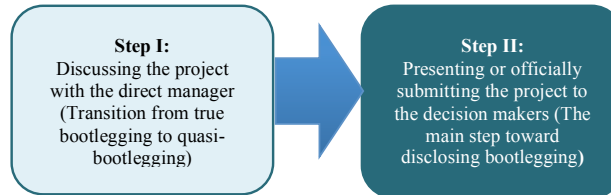
7.2.2.1. Why disclose the bootleg project

In order to discuss the elements that push interviewees to reveal their projects to the organisation and more specifically to the decision makers in order to become official projects, first we need to go back to the reasons for bootlegging. As was discussed in Chapter 5, the whole fundamental reason for bootlegging – that could be understood from all the reasons highlighted by the interviewees – is to reduce uncertainty about an idea in order to improve one's chances of securing official approval. Therefore, once securing official approval seems likely, there is no reason for continuing to work underground[121]. The following comments also support arguments presented above:

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[120] As was explained in Chapter 4, some interviewees need to officially submit their ideas via the system that is designed in their organisation to collect interviewees ideas (either online or offline) whereas others have to present their ideas in person or through their direct manger.

[121] Let's bear in mind that this research has identified no psychological reasons – such as psychological needs to pursue a secret project – for bootlegging. This is in contrast with what Augsdorfer's (1996) claim that the satisfaction from pursuing forbidden projects is a reason for bootlegging. Although Chapter 5 identified satisfaction from innovation and benefiting the organisation can be considered as a motivation

"I made the prototype… Having the prototype in hand, I was certain that I could talk them into it. So there is no need to hide … [the project] anymore …" (1044, Middle Manager, Research)

"It depends on the project, we generally always do feasibility studies. Sometimes we do make prototypes… it depends, we would go as far as to make sure that it is a convincing case... In this case it was the feasibility study stage that was done" (1054, Middle Manager, R&D)

The second issue that also confirms this argument is the issue of bootlegging limitations which were extensively presented in Section 6.6 of Chapter 6. From the limitations and difficulties of bootlegging cited by interviewees, a conclusion can be drawn that if they had the chance to pursue their ideas officially, the interviewees would not choose to go underground. The section – 6.6 of Chapter 6 – showed that 15 interviewees prefer to work on official projects and another 15 of them prefer to work on a mixture of bootleg and official projects. Therefore, it confirms the proposition that once they can secure official approval there is no reason to continue bootlegging.

The third issue that needs to be highlighted in this regard is that often projects reach a point where no further progress can be made unless the project becomes an official project and is supported by the senior management. This is the issue in nine cases, in addition to issues mentioned above, the interviewees highlighted that they need to reveal their project to the decision makers and make them official projects. For instance, as in one case, when an interviewee wants to incorporate his bootleg project in a product or process, becoming an official project is inevitable. He states:

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for bootlegging, this research did not find satisfaction from pursing forbidden project (or acting clandestinely) motivates interviewees to bootleg.

"*You get to a point that you need to implement the idea … and it isn't possible for*

a secret project…[to be implemented]" (1023, Staff, Product Development)

Thus, it can be argued that not being able to make further progress as result of

bootlegging is a limitation that can be considered as an element that influences the

bootleggers' decisions to reveal their bootleg projects, at least for nine interviewees.

7.2.2.2. Considerations in revealing bootleg projects

It is discussed in chapter 5 that interviewees hesitate to ask for official approval as the

first step when they come up with a new idea because the chance of getting official

approval is slim. It also can be inferred from their answers throughout the interview that

they avoid risking presenting their bootleg projects when they may be rejected and they

may delay presenting their bootleg projects until they are confident that they can get

official approval. In addition, let's bear in mind, as Appendix V demonstrates, 14

interviewees would not be able to go back to working on their project if they presented it

to the decision maker and they got rejected. Thus, it is logical to expect them to wait

until they are certain that they can secure official approval.

Another consideration for interviewees is the good time to reveal bootlegging. Since

bootleg projects have been hidden from the decision makers, they usually have to wait

for the right moment (or a particular event) to present their bootleg projects. These turns

of events are different from one project to another[122]. Each project discussed had its own

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[122] For instance, one interviewee had to wait until they pass a deadline so the management would agree in investing employees' time to the project. Another interviewees waited until they get close to deadline and the alternative method failed, so his technology would be the only practical solution. Another interviewee had to wait until the president of the company pay a visit to their department; so he can present the idea in person. Few interviewees waited for customers to come forward and ask for the product or a special feature in the product, so they would have easy work to convince the decision makers.

circumstances and the interviewees have to wait for a turn of event that changes their situation in the project's favour[123].

7.2.3. Exceptions to the two steps scenario

As was explained before, there are two situations which can be considered as exceptions to the scenario explained above as the common process of revealing bootleg projects. These two circumstance are: first, when the interviewee has a problematic relationship with his/her direct manager – in which case the first step does not occur; second, when the direct manager is the decision maker in regard to the bootleg project – in which case both steps merge.

7.2.3.1. Situations in which the first step does not occur

Subsection 4.6.2, in chapter 4, shows that there are three interviewees (1022, 1027 and 1041) who have a problematic relationship with their direct manager which is not based on mutual trust [124]. If these interviewees thinks that there is a chance they can convince the decision makers without having their direct manager's support, they may bootleg and then reveal the project to the decision makers directly, circumventing the direct manager.

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[123] Only one out of 49 projects was not formally presented to the decision maker – in this case the company CEO was the decision maker. This is an exceptional case in which the project was initiated by a middle manager and strongly supported by the direct manager who was a senior manager. Instead, it was decided to publish it in a press release. Since their customers showed a positive reaction to it, it became clear that it would benefit the company. Although the CEO disliked the idea, he did not officially kill the project. However, he starved the project after it became official.

[124] Often in this situation, the direct manager has a different background and experience; they do not understand the projects employees are working on and therefore do not appreciate the employee's attempts to be innovative.

One of them, who works in a relatively smaller corporation comparing to other, took his chance and presented his bootleg project directly to the president. He said:

"*I kept my ideas and I would bypass my direct boss because he was a fool and he has no inclination, no training to appreciate product design … as I said I didn't discuss it with my direct manager because I knew that he wouldn't approve it. So I went to see the managing director.*" (1022, Staff, Product Development)

The other two approached other senior managers who were on the committee that decided whether to approve or reject projects. In these two cases, they managed to convince another senior manager to back their project up when they present their idea to the decision maker. For instance two of them declared:

"*No, I didn't discuss it with my direct manager before discussing it with the decision makers. Because you know that would be an exercise in futility. It was just a waste of time. I would have spent an hour explaining what it was about and then he could not make decision on this and then he would have told me to talk to somebody else. What it would have done was it would have started a political interrogation ...*" (1027, Middle Manager, Product Development)

7.2.3.2. Situations in which the two steps merge

For three interviewees (1001, 1012, 1020)[125], their direct manager was the decision maker who approved or rejected the project and the interviewees did not need to present their projects to other managers. Thus the first and second stapes are combined. As can

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[125] In the case of Interviewee 1030, his direct manager was also the decision maker. The reason that this project was excluded from this section is that he did not reveal this bootleg project. This is discussed in the following section.

be understood from these interviewees' comments their good relationship with their direct manager is vital. Interestingly, the bootleg projects were revealed earlier in these circumstances, because convincing the direct manager is normally easier than convincing management who are higher up the hierarchy ladder and they might have less information and knowledge of the nature of the projects pursued by the interviewees. One of them mentioned:

> "*It was just after the initial stage. I wrote a mathematical formulation and developed an algorithm, but I did not implement it. Then I showed them to him and said here is the idea. It is going to eliminate all these steps and because of that I think it is going to be much faster...*" (1001, Staff, R&D)

The process of revealing bootleg projects to the decision maker who is the direct manager of the bootlegger is not as formal as presenting or submitting an idea to decision makers who are higher than the direct manager of bootleggers[126].

7.2.4. The stage at which bootleg projects are revealed

In order to comprehend the elements that influence disclosure of bootlegging, this research also investigated the stage at which bootleg projects are revealed to the decision makers. This also shows at which stage interviewees are confident that they can get

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[126] In such cases, interviewees may reveal their project when they are not too busy and there is no official deadline due. They then have a better chance of getting approval. Normally in such cases, the bootlegger reveals their project sooner than they would have if the direct manager were not the decision maker. In this situation, they may prepare a brief report giving initial findings but they will go no further than proof of concept. This is mainly because convincing the direct manager is much easier than convincing other more senior managers as direct managers are more familiar with the bootlegger's work.

official approval. Table 7.2, therefore shows the stages at which each bootleg project is

revealed.

Table 7.2: Stage in which bootleg projects were revealed				
Code	Positions	Primary Responsibility	Industry	Stage in which project is revealed
1001	Staff	R&D	Healthcare	Proof of Concept
1002	Senior Staff	R&D	E. S. C.	Prototype
1003	Middle Manager	Product Development	IT	Feasibility
1004	Staff	Product Development	E. S. C.	Feasibility
1005	Staff	Research	Healthcare	Proof of Concept
1006	Middle Manager	Product Development	E. S. C.	Feasibility
1007	Middle Manager	Product Development	E. S. C.	Proof of Concept
1008	Senior Staff	Technology Development	Healthcare	Feasibility
1009	Middle Manager	R&D	E. S. C.	Prototype
1010	Middle Manager	Product Development	Healthcare	Proof of Concept
1011	Senior Staff	Product Development	E. S. C.	Proof of Concept
1012	Staff	Product Development	E. S. C.	Proof of Concept
1013	Senior Staff	Product Development	Healthcare	Proof of Concept
1014	Senior Staff	Product Development	Healthcare	Proof of Concept
1015	Middle Manager	Product Development	E. S. C.	Feasibility
1016	Staff	R&D	IT	Proof of Concept
1017	Staff	Product Development	IT	Beta version
1018	Staff	Research	Telecommunication	Was never revealed
1019	Staff	Research	IT	Was never revealed
1020	Staff	Research	E. S. C.	Proof of Concept
1021	Middle Manager	Product Development	Healthcare	Prototype
1022	Staff	Product Development	E. S. C.	Proof of Concept
1023	Staff	Product Development	Telecommunication	Proof of Concept
1024	Senior Staff	Product Development	Healthcare	Proof of Concept
1025	Staff	Product Development	E. S. C.	Feasibility
1026	Senior Staff	Research	Telecommunication	Feasibility
1027	Middle Manager	Product Development	Healthcare	Feasibility
1028	Senior Staff	Research	IT	Prototype
1029	Staff	Product Development	IT	Beta version
1030	Staff	Technology Development	Telecommunication	Was never revealed
1031	Senior Staff	Research	IT	Proof of Concept
1032	Staff	Product Development	Healthcare	Proof of Concept
1033	Middle Manager	Product Development	Healthcare	Prototype
1034	Senior Staff	Product Development	IT	Prototype
1035	Staff	R&D	Healthcare	Feasibility
1036	Middle Manager	R&D	E. S. C.	Prototype
1037	Staff	R&D	IT	Feasibility
1038	Staff	R&D	IT	Proof of Concept
1039	Senior Staff	Product Development	IT	Feasibility
1040	Middle Manager	Research	Telecommunication	Feasibility
1041	Staff	Product Development	E. S. C.	Proof of Concept
1042	Staff	Research	Telecommunication	Was never revealed
1043	Staff	R&D	IT	Feasibility
1044	Middle Manager	Research	Telecommunication	Prototype
1045	Staff	Research	Telecommunication	Proof of Concept
1046	Staff	Technology Development	Telecommunication	Feasibility
1047	Senior Staff	Research	IT	Was never revealed
1048	Staff	Product Development	E. S. C.	Proof of Concept
1049	Senior Staff	Research	Telecommunication	Proof of Concept
1050	Senior Staff	Research	Telecommunication	Was never revealed
1051	Staff	R&D	IT	Proof of Concept
1052	Staff	Product Development	IT	Proof of Concept
1053	Senior Staff	Research	IT	Feasibility
1054	Middle Manager	R&D	Telecommunication	Feasibility
1055	Staff	Research	E. S. C.	Proof of Concept

Key: E. S. C.: Electrical and electronic sensors and control systems; **IT**: Information Technology

As is shown in this table, 23 projects were revealed to the decision maker once they

showed the "proof of concept" which means bootleggers only show that their suggested

technology is a valid solution for making or improving a product or solving the problem.

Those three interviewees whose direct manager was the decision makers presented their bootleg projects at this stage.

16 interviewees presented their ideas to the decision makers when they completed the feasibility study. The feasibility study is normally a stage after proof of concept when the interviewee gathers a variety of financial and market data[127] in addition to technical details. This may vary depending on the nature of the project. The great majority of interviewees whose position is staff would not go any further than this stage[128]. This is also true for the majority of senior staff, however there are three of them who made the prototype underground.

Only eight bootleg projects were revealed to decision makers after the prototype was made. It must be emphasised that two of the prototypes were only initial prototypes which means that more complicated prototypes were made after project became official. Senior staff who have made the prototype underground were strongly supported by their direct managers. Besides, middle managers seem to be more confortable to go as far as making prototypes[129].

Finally two projects were revealed once significant progress was made underground – one was revealed once 80% of the project was completed and the other one after 90% of

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[127] Financial data may include R&D costs, production costs, estimated sales, etc. Market data may includes an estimation of market size, market study, customers' need etc.

[128] This could because they face more limitations and have less freedom which limit them from going any further or it could be because they normally undertake less risky projects which make only a slight improvement to their product or process, as is discussed in the next section.

[129] We can argue that might be because they have better access to resources and they are able to ask a number of people to help them. Another argument could be they undertake more challenging projects, therefore in order to be able to convince the management they need to develop the project further.

the project was done; in other words, a beta version of their product was developed prior to being presented to the decision maker. It must be mentioned both these projects were software related projects developed in software companies.

The second issue is about limitations in the healthcare industry. The only two projects that went through to prototype stage were medical device projects pursued by middle managers. These are the only cases that where it seemed possible for the interviewee to go that far. For those interviewees who work in the pharmaceutical sector, it is even very hard to complete the proof of concept stage. In other words, they can barely complete the cell test of their drugs for instance. It is even much harder to get to the animal test stage underground, not to mentioned that it is impossible to do human testing for such projects.

7.3. Buried Bootleg Projects

One of the initial issues raise during the data collection process which this researcher was prepared to grasp was that of bootleg projects that were not revealed to decision makers and which got buried. This type of bootleg project has been hidden from the eyes of previous researchers on bootlegging. No previous paper has ever studied or discussed such projects.

Six of 55 bootleg projects, discussed in detail with the interviewees, were never revealed to the decision makers; i.e. projects discussed with interviewees 1018, 1019, 1030, 1042, 1047 and 1050. These projects reached the point where it became clear they would not have any financial benefit for the company, despite the fact that this was their initial purpose. Thus, there was no reason to submit them formally or present them to decision makers, as two interviewees declared:

 "*Again it was just a preliminary study based on which there are enough reasons to believe that there couldn't be something like a tangible result… No, it was one of those situations where it did not line up with the greater vision.*" (1042, Staff, Research)

"*I kept it in the background for a while to see what level of confidence I have as times goes on. Typically it often means that a lot of ideas do show weaknesses after a while… Some sort of basic feasibility studies, but this particular one that I picked didn't really move forward past basic feasibility study, basic measurements… So there was no reason to go to management.*" (1050, Senior Staff, Research)

As is clear from the above comments, if the bootleg project fails, shows weakness or reaches a point where the bootlegger can see no benefit for the organisation, it will not be revealed to the decision makers. These projects can be considered as failures when for instance: "*the idea is rejected from a technical perspective*", "*the solution isn't sound*", "*the problem is bigger than expected*", "*the subject is too complicated*", or it cannot be executed using existing resources within a limited time.

In addition, if the interviewee feels that s/he can not convince the management or that they are not interested, they also have no reason to reveal the project to the decision makers. For instance, interviewee 1030 mentioned that he got the sense that management was not interested, although the project had made a good progress, so he decided not to disclose the project[130]. In another case, interviewee 1047, who was pursuing another solution as a backup to an on-going official project, once he saw that the method pursued officially worked and there was no need for his solution[131].

Therefore, if the interviewees are not able to fulfill the reason for which they go underground and they are not able to make a convincing case to get official approval then they would not reveal their bootleg projects.

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[130] "*I might have discussed it socially but since I got the feeling that it was outside their interest there was not formal discussion.*" (1030, Staff, Technology Development)

[131] "The other approach continues to go well and this is a backup strategy… this was the end of phase one … I stopped the project" (1047, Senior Staff, Research)

7.4. Bootlegging Outcomes

This section focusses on the results of bootleg projects to answer the fourth research question: what are the tangible and intangible outcomes of bootlegging? This research primarily tries to find out what sorts of innovation result from bootlegging. In addition, it finds that some bootleg projects have other outcomes such as invention[132] - rather than innovation – and problem solving. It is also important to investigate outcomes of failed (e.g. unrevealed) and rejected bootleg projects. This section focuses on the outcomes of 55 bootleg projects that are discussed in detail[133].

7.4.1. Innovation result from discussed bootleg projects

Of the 55 projects discussed in detail with interviewees, 39 projects resulted in innovation, 35 of which impacted the organisations' products and are considered as product innovations. The other four of them influenced organisational processes by improving the accuracy of processes or reducing the costs of processes, so their results can be identified as process innovation (Davenport, 1993). The four process innovations have improved a range of organisational functions: one in the R&D process, one in product design, and two in the production process.

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[132] In this case, the bootlegging results in an inventive outcome which cannot be applied directly in any product or process in the company and therefore it does not benefit the organisation financially. This type of project might still benefit the organisation by knowledge creation or learning for inventors and other employees. They might be patented and improve the image of company as an intellectual property of company or it might be sold to another organisation later down the road.

[133] In addition, Appendix VIII covers outcomes of bootleg projects pursued in last two years by interviewees which give us a wide perspective by considering results of a larger number of bootleg projects. The research findings presented in Appendix VIII confirm the findings based on the 55 discussed bootleg projects.

Table 7.3 shows characteristics of these innovations including newness of innovation, applied technology and level of patent protection. 16 out of the 39 innovations yielded by bootlegging represent slight improvements upon existing products or processes, while 20 out of the 39 product innovations represent significant improvements upon existing products. Only three innovations resulted in new products for the company; even these products are no more than alternatives to products that already exist in the market – produced by competitors. In other words, none of the projects resulted in the creation of a totally new product in the market, as is also shown in Figure 7.3. This Figure also demonstrates that all four process innovations are significant improvements upon existing processes within companies.

Figure 7.3: Newness of product and process innovations resulting from bootlegging
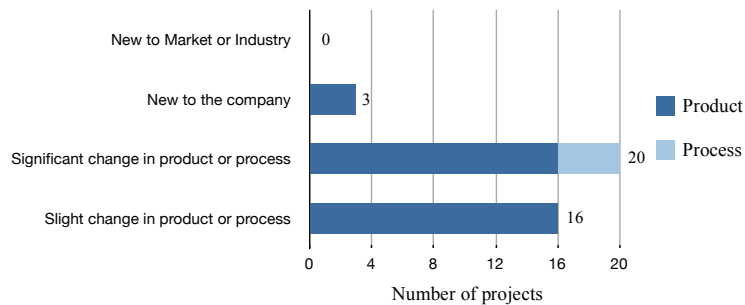
As can be seen from Table 7.3, ordinary staff tend to undertake projects that slightly change the characteristics of their existing products, whereas the three projects that resulted in a new product for the company are outcomes of bootleg projects pursued by middle managers. Those who work in healthcare industry seem to make significant changes in product or process characteristics rather than creating a new one or even slightly changing a product or process.

Table 7.3: Characteristics of innovations result from bootleging

Code	Positions	Primary Responsibility	Industry	Product Innovation	Process innovation	Newness: New to Market or Industry	New to the company	Significant change in product or process	Slight change in product or process	Technology: Application of proprietary technology	Application of new technology	Application of existing technology	Patent protection: Significant	Limited
1001	S	R&D	Health.		✓			✓			✓		✓	
1002	S S	R&D	E. S. C.	✓				✓				✓	✓	
1003	M M	Pro Dev	IT	✓			✓				✓		✓	
1004	S	Pro Dev	E. S. C.	✓					✓			✓		✓
1007	M M	Pro Dev	E. S. C.	✓			✓					✓		✓
1008	S S	Tech Dev	Health	✓				✓		✓			✓	
1009	M M	R&D	E. S. C.	✓				✓			✓		✓	
1010	M M	Pro Dev	Health	✓				✓				✓		✓
1012	S	Pro Dev	E. S. C.	✓					✓			✓		✓
1013	S S	Pro Dev	Health		✓			✓				✓		✓
1014	S S	Pro Dev	Health	✓				✓			✓		✓	
1015	M M	Pro Dev	E. S. C.	✓				✓				✓		✓
1016	S	R&D	IT	✓					✓	✓			✓	
1017	S	Pro Dev	IT	✓					✓			✓		✓
1020	S	Research	E. S. C.	✓					✓		✓			✓
1021	M M	Pro Dev	Health		✓			✓			✓			✓
1022	S	Pro Dev	E. S. C.	✓				✓				✓		✓
1023	S	Pro Dev	Telecom	✓					✓			✓		✓
1024	S S	Pro Dev	Health	✓				✓			✓		✓	
1025	S	Pro Dev	E. S. C.	✓					✓			✓		✓
1026	S S	Research	Telecom	✓					✓		✓		✓	
1027	M M	Pro Dev	Health	✓				✓		✓			✓	
1028	S S	Research	IT	✓				✓			✓		✓	
1029	S	Pro Dev	IT	✓					✓			✓		✓
1031	S S	Research	IT	✓					✓		✓		✓	
1032	S	Pro Dev	Health	✓					✓		✓		✓	
1033	M M	Pro Dev	Health	✓				✓				✓		✓
1034	S S	Pro Dev	IT		✓			✓		✓			✓	
1035	S	R&D	Health	✓				✓				✓		✓
1036	M M	R&D	E. S. C.	✓			✓			✓			✓	
1037	S	R&D	IT	✓					✓		✓			✓
1038	S	R&D	IT	✓					✓		✓			✓
1039	S S	Pro Dev	IT	✓				✓			✓		✓	
1043	S	R&D	IT	✓					✓		✓		✓	
1044	M M	Research	Telecom	✓				✓		✓			✓	
1046	S	Tech Dev	Telecom	✓				✓		✓			✓	
1051	S	R&D	IT	✓					✓		✓		✓	
1052	S	Pro Dev	IT	✓					✓			✓		✓
1054	M M	R&D	Telecom	✓				✓			✓			✓

Key: S: Staff, **S S:** Senior Staff,   **M M:** Middle Manager,   **Pro Dev:** Product Development **Tech Dev:** Technology Development **Telecom:** Telecommunication, **E. S. C.:** Electrical and electronic sensors and control systems,   **Health:** Healthcare, **IT:** Information Technology

Figure 7.3 illustrates that only seven of these innovations benefited from proprietary technology, while 16 were based on the application of new technology, and the other 16 projects were based on new applications of existing technology. As is shown in Table

7.3, the ordinary staff and/or those who focus on product development tend to use existing technologies in their bootleg projects, for instance they apply a technology that is currently used for a different purpose or in a different industry. Meanwhile, bootleg projects whose primary responsibility is technology development or research benefit more from new or even proprietary technologies than bootleg projects of R&D and product development employees.

Figure 7.4: Technology applied in these innovations
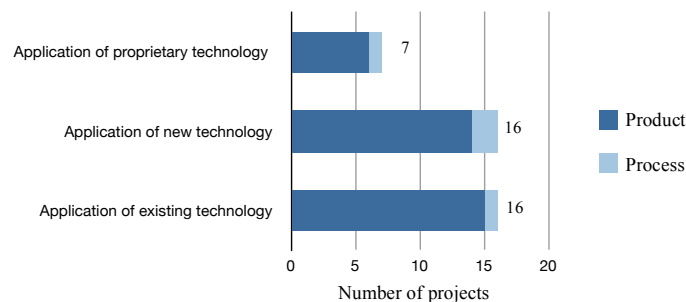
Figure 7.5 and Table 7.3 illustrate that 20 of the bootleg projects brought in significant gains in intellectual property whereas, in 19 bootleg projects, intellectual property was considered to be limited[134]. As is shown in the Table 7.3, the intellectual property involved in projects pursued by senior staff and middle managers is more significant than the intellectual property involved in projects pursued by ordinary staff. In addition,

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[134] Two levels of intellectual property were considered for these innovations: significant or limited. By significant, this research means the interviewees and their organisation filed at least one patent application based on the bootleg project. Limited means the intellectual property was not important enough to file a patent application to protect it. Let's bear in mind that in two cases, the interviewee mentioned that the intellectual property involved in the project was significant however they decide not to file a patent application because it would reveal some insight into their projects and they wanted to keep all the information in house. In such cases, the level of intellectual property involved in the project was considered as significant.

projects followed by those who focus on R&D, technology development and research also embrace higher levels intellectual property than projects pursued by product development employees.

Figure 7.5: Intellectual property involved in these innovations
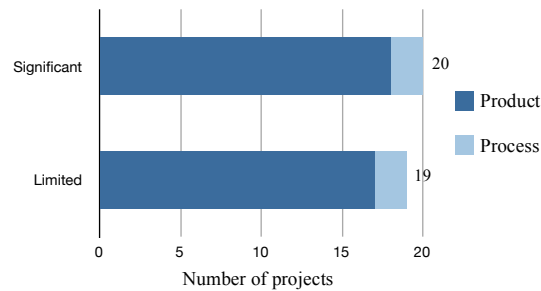
To examine the type of innovation (radical or incremental) which result from these 39 bootleg projects, Henderson and Clark's (1990) models is applied[135]. This model, as is shown in Figure 7.6 identifies four types of innovation based on the influence of innovation on core component (shown on horizontal dimension of the figure) and connection between core concept and components (shown on vertical dimension of the figure)[136]. It identifies two main type of radical and incremental innovation and two

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[135] In order to determine the type of innovation result from bootlegging, the author had to choose one of existing definitions of radical and incremental innovation in the literature. Several definitions, including those presented by Abetti (2002), Afuah (1998), Henderson and Clark (1990), Leifer *et al.* (2002), O'Connor (2008), were considered. Among them Henderson and Clark (1990), as the most cited definition, was applied. It must be highlighted that the choice of definition determines how data is collected and later analysed, so the outcome of this section is subject to the definition of radical and incremental innovations used. So it could be argued that if different definitions were applied, the result could vary.

[136] Henderson and Clark's (1990) model is based two elements of innovation which are shown in Figure 7.6. The element shown in the horizontal dimension of this figure is the influence of innovation on core concept and the second element that is shown in the vertical dimension of this figure is the connection between core concept and components. Based on these elements, Henderson and Clark call an innovation radical when it is based on a new core concept in which the design of product or process (the connection between core concept and components) changes. Whereas, in incremental innovation, changes occur

more types of innovation (modular and architectural) which are considered to be somewhere between radical and incremental innovation.

Figure 7.6: Framework for defining innovation
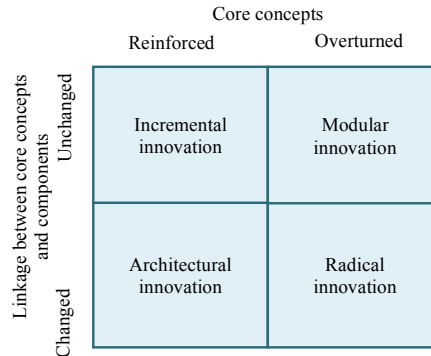
Source: Henderson and Clark (1990)

In order to use Henderson and Clark's (1990) framework for evaluating radicalness of the 39 innovations resulting from the discussed bootleg projects, Table 7.4 shows changes in core concept and connection between core concepts and components. Based on these two changes, Table 7.4 shows the types of innovation that resulted from the 39 innovations. As the table illustrates, only three of the innovations resulting from bootlegging are identified as radical innovations, while 15 innovations match Henderson and Clark's definition of incremental innovation. In total 21 innovations are identified to be neither radical nor incremental; 13 of them are modular innovations and eight of them are architectural innovations.

within individual components and the core concept and the design of product (or process) do not change. As can be seen in Table 7.6, they also distinguish two other type of innovation which are neither radical nor increment. These types of innovation are modular innovation – where the connection between components and core concept (design of product) does not change, however the core concept changes – and architectural innovation – in which the core concept remains the same however the design (connection between components and core concept) changes. Since Henderson and Clark's model is used to identify types of innovation, this research also recognises these types of innovation and tries to identify if any of the bootleg projects result in these types of innovation.

Code	Positions	Primary Responsibility	Industry	Product innovation	Process innovation	Change in core concept		Connection between component and concept		Type of innovation			
						Core concept or design changes	A component changes	Changed	Unchanged	Radical innovation	Modular innovation	Architectural innovation	Incremental innovation
1001	S	R&D	Health.		✓	✓			✓		✓		
1002	S S	R&D	E. S. C.	✓			✓	✓				✓	
1003	M M	Pro Dev	IT	✓		✓			✓		✓		
1004	S	Pro Dev	E. S. C.	✓			✓	✓				✓	
1007	M M	Pro Dev	E. S. C.	✓			✓	✓				✓	
1008	S S	Tech Dev	Health	✓		✓		✓		✓			
1009	M M	R&D	E. S. C.	✓			✓		✓				✓
1010	M M	Pro Dev	Health	✓		✓			✓		✓		
1012	S	Pro Dev	E. S. C.	✓			✓		✓				✓
1013	S S	Pro Dev	Health		✓		✓		✓				✓
1014	S S	Pro Dev	Health	✓		✓			✓		✓		
1015	M M	Pro Dev	E. S. C.	✓			✓	✓				✓	
1016	S	R&D	IT	✓		✓			✓		✓		
1017	S	Pro Dev	IT	✓			✓		✓				✓
1020	S	Research	E. S. C.	✓			✓		✓				✓
1021	M M	Pro Dev	Health		✓	✓			✓		✓		
1022	S	Pro Dev	E. S. C.	✓			✓		✓				✓
1023	S	Pro Dev	Telecom	✓			✓		✓				✓
1024	S S	Pro Dev	Health	✓			✓		✓				✓
1025	S	Pro Dev	E. S. C.	✓			✓		✓				✓
1026	S S	Research	Telecom	✓		✓			✓		✓		
1027	M M	Pro Dev	Health	✓		✓			✓		✓		
1028	S S	Research	IT	✓			✓	✓				✓	
1029	S	Pro Dev	IT	✓			✓		✓				✓
1031	S S	Research	IT	✓		✓			✓		✓		
1032	S	Pro Dev	Health	✓			✓		✓				✓
1033	M M	Pro Dev	Health	✓			✓	✓				✓	
1034	S S	Pro Dev	IT		✓		✓	✓				✓	
1035	S	R&D	Health	✓		✓			✓		✓		
1036	M M	R&D	E. S. C.	✓		✓		✓		✓			
1037	S	R&D	IT	✓			✓		✓				✓
1038	S	R&D	IT	✓			✓		✓				✓
1039	S S	Pro Dev	IT	✓			✓	✓				✓	
1043	S	R&D	IT	✓		✓			✓		✓		
1044	M M	Research	Telecom	✓		✓		✓		✓			
1046	S	Tech Dev	Telecom	✓		✓			✓		✓		
1051	S	R&D	IT	✓			✓		✓				✓
1052	S	Pro Dev	IT	✓			✓		✓				✓
1054	M M	R&D	Telecom	✓		✓			✓		✓		

Table 7.4: Measuring radicalness of innovation applying Henderson and Clark's (1990) model

Key: S: Staff; **S S:** Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

Table 7.5 summarises data presented in Table 7.4 – the influence of these 39 innovations and the types of these innovations – for different groups of interviewees in different positions, the units they are come from and their industries. Three innovations identified as radical innovations are pursued by two middle managers or a senior staff member

who was strongly supported by his direct manager[137]. Senior staff and middle managers are also responsible for most of the modular (eight out 13) and architectural innovations (seven out of eight). While the majority of incremental innovations in this sample (12 out of 15) are pursued by staff. This is mainly because the majority of innovations pursued by staff (13 out of 18) were targeting specific components in product or processes rather than the core concept or design. Besides, only one of the innovation pursued by a staff member influenced the connection between components and concepts.

Table 7.5: Type of innovations result from bootlegging for different groups of interviewee

Different groups		Type of innovation			
		Radical innovation	Modular innovation	Architectural innovation	Incremental innovation
Position	Staff	0	5	1	12
	Senior Staff	1	3	4	2
	Middle Manager	2	5	3	1
	Total	3	13	8	15
Primary Responsibility	Research	1	2	1	1
	Technology development	1	1	0	0
	R&D	1	5	1	4
	Product development	0	5	6	10
	Total	3	13	8	15
Industry	IT	0	4	3	6
	Telecommunication	1	3	0	1
	E. S. C.	1	0	4	5
	Healthcare	1	6	1	3
	Total	3	13	8	15

Looking at types of innovation pursued by interviewees who come from different units shows us that employees in product development groups tend to pursue incremental and architectural innovations whereas, all the radical and the majority of modular innovations (eight out of 13) are pursued by research, technology development and R&D employees.

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[137] The unit that interviewee 1008 works in is based in a different geographic location from the company headquarter. Their unit is run by the direct manager of the interviewee who happens to be close friend of his. Thus the direct manager strongly supported the bootleg project and helped the interviewee to cover the project and protect it from senior management interruption.

Considering the small number of innovations, there is no significant difference in types of innovations pursued by interviewees from different industries. However, it must be said that it is surprising that a radical innovation and six modular innovations were found in the healthcare industry despite the limitations previously highlighted in Chapter 4.

The final issue to be discussed here is the success rate for underground innovations after they have been implemented by the organisation. All four of the process innovations were successfully[138] implemented. As is shown in Figure 7.7, 19 out of 35 product innovations have been successful[139] so far. One product had already failed in the market. It seems that the project faced some difficulties during the process of incorporation into the company; it was neglected and completed with a design fault. The result was that the product did not work as it was supposed to and it failed in the market place.

Figure 7.7: Success and failure rate of implemented bootleg projects so far
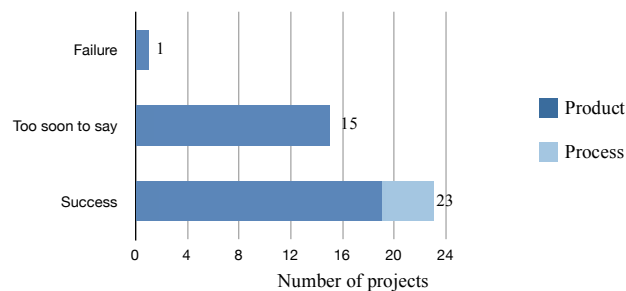
Unfortunately, as is clear in Figure 7.7, 15 interviewees were unable to confirm whether the product innovations yielded by bootlegging had succeeded in the market. This is

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[138] Process innovations which are identified as successful have been successfully implemented in the organisation and as interviewees mentioned they have succeeded in delivering the benefits that they promised since they were incorporated.

[139] The success and failure of these innovations are purely based on interviewees' judgments. By successful product innovation, this research means that the product has been well received by customers, met customers' expectations, raised customers' satisfactions and sold well in the market.

because 9 of them have not yet hit the market and other 6 had just recently hit the market and it was too soon to assess their market and customers' reactions to them.

7.4.2. Outcomes of projects that didn't result in innovation

16 out of 55 discussed bootleg projects did not directly result in innovation. These project outcomes are covered in this sub-section. Table 7.6 illustrates the end result and outcomes of these 16 projects.

Code	Positions	Primary Responsibility	Industry	Project final status	Invention	Problem solving	Knowledge creation & learning	No benefit at all
1005	S	Research	Health	Incomplete	✓			
1006	M M	Pro Dev	E. S. C.	Rejected				✓
1011	S S	Pro Dev	E. S. C.	Implemented		✓		
1018	S	Research	Telecom	Not revealed				✓
1019	S	Research	IT	Not revealed			✓	
1030	S	Tech Dev	IT	Not revealed				✓
1040	M M	Research	Telecom	Incomplete	✓			
1041	S	Pro Dev	E. S. C.	Incomplete	✓			
1042	S	Research	Telecom	Not revealed			✓	
1045	S	Research	Telecom	Incomplete	✓			
1047	S S	Research	IT	Not revealed				✓
1048	S	Pro Dev	E. S. C.	Incomplete			✓	
1049	S S	Research	Telecom	Incomplete			✓	
1050	S S	Research	Telecom	Not revealed			✓	
1053	S S	Research	IT	Incomplete	✓			
1055	S	Research	E. S. C.	Failed				✓

Table 7.6: Outcomes of projects that did not directly result in innovation

Key: Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development; **Telecom**: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare; **IT**: Information Technology

As mentioned in section 7.3, six projects were never revealed to the decision makers as the results they produced were not applicable for the organisation. Among them one took a direction that was of no benefit to the organisation – followed by 1030 – and two showed some weaknesses – reviewed by 1018 and 1047 – so the interviewees decided to drop them. So, they had no benefit to the organisation. The other three – discussed by 1019, 1042 and 1050 – can be considered to have delivered the benefits of knowledge creation and learning to the organisation since the interviewees subsequently presented

conference papers based on the result of these projects and shared the knowledge with their colleagues and conference attendees. In addition, one interviewee – 1050 – also highlighted that publishing papers also acts as some sort of advertisement for their organisation and this is another way in which his project benefitted the organisation. He claimed:

> "*It is also understood that publication is good advertising. So even if the idea doesn't work eventually if you can make it to the threshold of a paper the company can get something out of it.*" (1050, Senior Staff, Research)

Among 49 revealed projects, one was rejected by the management right after being presented to the decision makers – that pursued by 1006. Since only the feasibility of the idea was studied underground, it is not possible to consider any benefit for the organisation. Besides, one project – discussed by 1055 – that initially got official approval showed some technical weakness and consequently failed as an official project. So it did not benefit the organisation since it was abandoned not long after proof of concept stage.

One project – discussed by 1011 – that was presented to the decision makers and then implemented, solved a crucial problem with a product; the interviewee conceded that the outcome was more to do with problem solving than innovation.

There are also seven projects shown in Table 7.6 marked as incomplete. These projects are identified as incomplete projects as they have not been implemented officially in the organisation; they are currently at different stages of official development. One project – discussed by interviewee 1048 – had the benefit of learning about a technology for the organisation, he mentioned:

"In the future if we decide to do it, we have the groundwork done and ready to implement ... I would say learning ... [specific technology] was the benefit of this project" (1048, Staff, Research)

Six of these projects yielded inventions that could potentially benefit the organisation, though they have yet to be implemented. The companies filed patent applications, but so far they have not influenced any product or process. As the company has not been able to directly benefit from it, the result might be better described as an invention rather than an innovation[140].

Although these projects have become official, they are still in developmental stages; either the interviewees or other people in their organisation are currently working on these projects. As they are bottom up projects, they may face some delays and problems after becoming official which make the development and implementation processes considerably longer than the normal process for top-down projects[141].

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[140] These inventions can also benefit the organisations. For instance one interviewee mentioned: *"The intellectual property improves company's image in the industry"* (1053, Senior Staff, Research)

[141] The limitations that bootleg projects face have been covered in Section 6.6. of Chapter 6. Often these limitations cause some delays and problems for bootleg project after becoming official. The following comments clearly shows these limitations:

> *"They were interested a little and they didn't take any action… Not that they didn't give me resources directly. They asked for more data and at that point they didn't give any extra resources but I just kept working on it and even to this date I am still proving it ..."* (1040, Middle Manage, Research)
>
> *"We could have benefitted significantly. They say they are interested but nobody threw money behind it."* (1045, Staff, Research)
>
> *"But I have got a better result, probably the top result in the industry and globally. I have a top result and I presented it to the conference. Actually more people outside the company show their interest"* (1049, Senior Staff, Research)

7.5. Summary of This Chapter

This chapter focusses on two issues: the disclosure stage of bootlegging and their outcomes to answer our third and fourth research questions. Thus the summary of this chapter includes two sections: disclosing bootleg projects and bootleg project outcomes. Previous literature has barely discussed these two issues; and there is a clear disagreement on the types of innovation that result from bootlegging.

7.5.1. Disclosing bootleg projects

Initially this chapter tries to find out what factors influence bootleggers' decisions to reveal their projects. As explained in chapter 2, previous literature has made a limited contribution to this issue. According to Augsdorfer (1996, 2005), very few bootleg projects remain underground once the feasibility of the idea has been proved, while Abetti (1997a, 1997b, 1999a, 1999b) discussed projects that were revealed once the development processes were completed and even after they received customers' orders for the product. Augsdorfer (1996) and Koch & Leitner (2008) found out that bootlegging is continued until no further underground progress is possible and the project needs managerial support.

This research enhances our interpretation of disclosure of bootlegging by revealing that it normally occurs in two steps: first, approaching the direct manager (transition from true bootlegging to quasi-bootlegging); and second, presenting the bootleg project to the decision makers (the actual stage of revealing a bootleg project to the organisation). This has been hidden from previous researchers. Figure 7.8 shows these two steps and elements that influence interviewees' decisions to take each step.

Figure 7.8: The process of revealing bootlegging and elements that influence interviewees' decision in each step
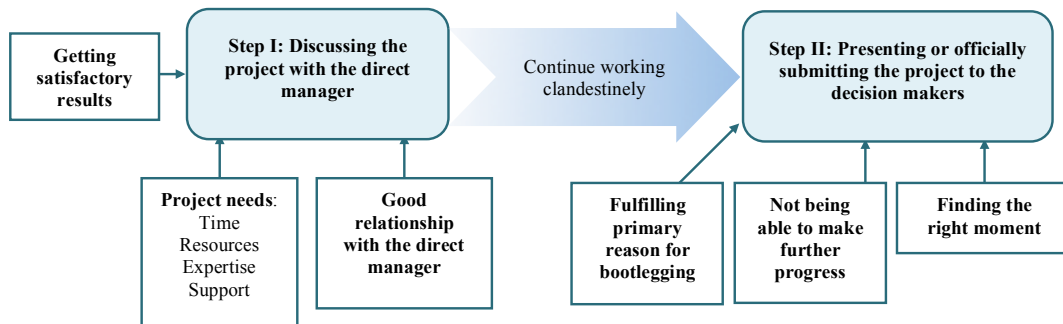
The initial element that is crucial for revealing every bootleg project is getting satisfactory results that show the organisation would benefit from the project. If the bootleg project failed or did not reach the point that would have direct benefit for the organisation, the interviewees would not consider revealing it. The second element that pushes interviewees to take the first step and discuss their bootleg projects with their direct manager is the project's needs – support, time, resources and expertise. Chapter 6 explained how interviewees acquired their bootleg projects' needs. This chapter expanded on this issue by specifying direct manager' roles which include giving resources, freedom and technical advice; protecting the project from interruption; backing up the project when it is time to reveal it to decision makers (supporting the bootlegger); and occasionally presenting it to the decision makers. These roles played by the interviewees' direct manager show that bootleg projects' needs also push interviewees to approach their direct manager. Although Augsdorfer (1994, 1996) and Abetti (1999a) discuss different managerial attitudes toward bootlegging and their

influence on bootlegging, neither of them presents detailed discussion on the role of management in bootlegging[142].

The third element that influences interviewees' decisions to approach their direct manager is having good relationship with him/her based on mutual trust and understanding. Having a good relationship with the direct manager, as explained before, means that the interviewee trusts his/her direct manager and to some extent the direct managers can understand the interviewees' ideas and work. On the other hand, if the bootlegger does not have a good relationship with his/her direct manager, s/he may go behind the direct manager's back and possibly approach a senior manager directly to gain support for presenting the project to the decision makers or directly go to the second step.

It must be highlighted that approaching the direct manager alone does not usually mark the end of the bootleg project and reveal the bootleg project since direct managers are rarely the decision makers and most bootleggers continue to work underground after discussing it with their direct manager. As is shown in the figure, this is the first step toward revealing the bootleg project. Only if the direct manager is the only decision maker do these two steps merge.

As is shown in Figure 7.8, the second and the main step in disclosing a bootleg project is when the interviewees present them to the decision makers. Interviewees are spurred to reveal their projects when they are sufficiently confident that they will be able to

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[142] This is possibly because these papers discuss managerial attitudes towards bootlegging from the management perspective. Besides, they did not distinguish decision makers from other levels of management and whether the direct manager of bootleggers is the decision maker who accepts or rejects bootleg projects at the end of the day.

convince the decision makers and secure official approval; when the uncertainty surrounding the innovations (the fundamental reason for bootlegging) have been overcome, they no longer have any reason to hide the project – also highlighted by Burgelman (1983). So the first element that influences their decision to disclose bootlegging is fulfilling the primary reason for bootlegging.

The second element, highlighted in this chapter which was also found by Augsdorfer (1996) and Koch & Leitner (2008) to influence interviewees' decisions to present their work to the decision makers is often that bootleg projects have reached the point where no further progress is possible underground and the project must become official in order to go any further. The limitation of bootlegging, highlighted in subsection 7.2.2 and extensively discussed in section 6.6, are contributing factors in this regard.

The final element is that influences interviewees' decisions is finding the right moment to reveal their bootleg projects. Since bootleg projects are hidden from the decision makers, bootleggers usually have to wait for the right moment (or a particular event) to present their bootleg projects. This issue is also discussed by Abetti (1999a).

Revealing bootleg projects mainly happens after a proof of concept or feasibility study has been produced. In some cases, an initial prototype might be made, but it is very rare for a project to be pursued underground beyond this point. The bootlegger might also need to prepare a presentation, a brief document or a detailed report. Therefore, few previous papers have discussed some of the elements that contribute to decisions to reveal bootlegging because none have been as comprehensive as this research.

7.5.2. Bootlegging outcomes

In order to understand the tangible and intangible outcomes of bootlegging, this chapter discusses outcomes of the bootleg projects discussed in detail with interviewees. In

addition, outcomes of bootleg projects pursued by the interviewees in last two years are also covered in Appendix VIII which strongly confirms the discussion presented in this chapter.

Figure 7.9 shows the outcomes of the 55 discussed bootleg projects of which 39 resulted in innovation (35 product innovations and four process innovations). Careful examination of these innovations demonstrated that they mainly led to improvements (from slight to significant) in existing products or processes. Only three projects resulted in new products, and these were substitutes for products already on the market. Moreover, more than half of these projects – 27 out of 39 – were based on the application of new or existing technology; whereas only seven projects were based on proprietary technology. 20 of the innovations have significant intellectual property, whereas the level of intellectual property in other 19 innovations was limited.

Figure 7.9: The outcomes of 55 bootleg projects discussed by interviewees
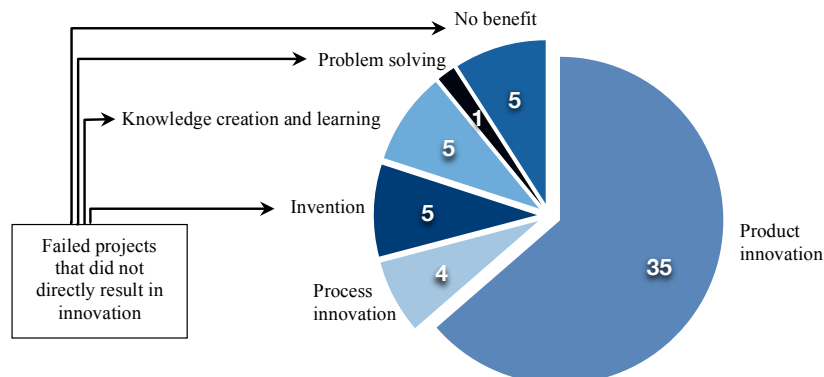
* The figure shows that 11 out of 16 bootleg projects that failed to result in innovation have other intangible benefits for the organisation.

In terms of type of innovation, only three of these 39 bootleg projects are identified as radical innovations, according to Henderson and Clark's (1990) model, which were pursued by two middle managers and a senior staff member. While 15 projects were identified as incremental innovations; of which 12 were pursued by staff. Besides, 10 of

15 incremental innovations were pursued by people who work in product development. The rest of the 39 projects (21 projects) are classified as modular (13) and architectural (8) innovation which are neither radical or incremental innovations. Consequently, it can be argued that bootleg projects rarely result in radical innovation which confirms Augsdorfer's (1996) finding.

Aside from these 39 projects, 16 projects failed to result in innovation; this type of project has not been discussed in management literature hitherto. 11 of these 16 projects brought intangible benefits to the organisations concerned (Figure 7.5). Five resulted in invention; their outcomes have been patented but not yet implemented in the organisation. Five projects resulted in knowledge creation and learning – which confirms Evink & Beam (1999) Berends et al. (2007) argument – as their outcomes have been published as conference papers and shared with the bootlegger's colleagues and conference attendees. Three interviewees also stressed that projects which result in a patent application or a paper significantly benefit their organisations as they are considered to be valuable advertising and improve the image of the company. Finally, one project solved a crucial problem with a product; its outcome had more to do with problem solving than with innovation.

CHAPTER 8:

CONCLUSIONS, CONTRIBUTIONS TO KNOWLEDGE AND PRACTICAL IMPLICATIONS

8.1. Introduction

This chapter concludes the thesis by summarizing the research findings and discussions presented throughout the document, it also highlights the contribution of this research to knowledge. In addition, as an empirical research on one of the under-researched topics in management literature, this research has some valuable practical implications that are highlighted in this chapter. Finally the chapter concludes with recommendations for further area of research.

8.1.1. Layout of this chapter

Primarily, this chapter (in section 8.2) covers conclusions of discussions presented in previous chapters by answering the four research questions. The chapter follows with research contributions to knowledge in section 8.3. Then, the next section (8.4) of this chapter presents the practical implications of this research for both academia and management fields. Finally, the fifth section (8.5) proposes recommendations for further areas of research.

8.2. Research Conclusions

To conclude this thesis, this section summarises different types of bootleg projects observed by this research. It then answers the following four research questions by reviewing discussions presented in previous chapters. The research questions include:

RQ 1. Why do employees choose to bootleg?

RQ 2. How do bootleggers find the time and acquire the resources and expertise to operate clandestinely?

RQ 3. What are the factors that cause bootleggers to reveal their clandestine projects?

RQ 4. What are the tangible and intangible outcomes of bootlegging?

This research is based on 55 in-depth interviews with staff, senior staff and middle managers who work in research, technology development, R&D and product development departments of medium size and large corporations ranging through healthcare, electrical and electronic sensors and control system, information technology and telecommunication sectors. Interviewees are experienced and well educated individuals who are known for their innovative ideas in their units or in the company. These interviewees work in units differing in terms of management style and in the level of freedom they have. They are not in position to make critical R&D decisions such as choosing or rejecting projects for their units. Besides, a large majority of them do not have access to financial resources and thus are not able to use significant amounts of resource for their bootleg projects.

8.2.1. Spectrum of bootlegging

This research identified two main types of bootlegging:

- True bootlegging: Bootleg projects pursued by an employee and a few of his/her colleagues. Neither the direct manager of the bootlegger nor the senior management is aware of them.

- Quasi-bootlegging: bootleg projects, initiated by employees, which are hidden from most of the organisation. However the bootleggers may discuss them with their direct manager, not to get permission to work on them, but to acquire the manager's opinion or support. It should be noted here that the projects remained completely hidden from senior management and decision makers[143].

In addition, this research identified another type of bootlegging called hardcore bootlegging which refers to bootleg projects which have been previously rejected by management or which fall within areas prohibited by the decision makers. It must be highlighted although true bootleg projects and quasi-bootleg projects can be hardcore as well, this research did not find many of this type.

The majority of previous papers discussing bootlegging highlight benefits of bootlegging whereas only three papers – Roberts (1991), Roussel *et al.* (1991), and Ma (2002) – raised concerns that bootlegging may conflict with the organisation's strategy. This research found that bootleg projects are highly related to the on-going business of organisation and therefore they do not challenge organisations' strategy. Even hardcore

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[143] It must be highlighted that in disclosure stage of bootlegging, prior to being presented to the decision makers, true bootleg projects first become quasi-bootleg project as the bootleggers discuss them with their direct manager to gain their support.

bootleg projects do not contradict organisation strategy and they match the on-going business of the organisation.

Besides, previous papers – e.g. Salomo & Mensel (2001), Talke et al. (2006), and Koch & Leitner (2008) – discuss bootlegging as it occurs in early stage of innovation. This research observes various bootleg projects that were classified in three categories:

- Projects based on new ideas related to the companies' mainstream business.

- Projects based on previous research and development projects that had been stopped or killed.

- Projects that are part of an official project.

Having found these types of bootlegging, This research was able to show that bootlegging occurs at different stages of Cooper's (1990) *stage-gate* process and then it argued that bootlegging occurs throughout the product development process. Bootlegging may also create loops to go back through the *stage-gate* process by working on a project that is in final stages of the stage-gate process or retrieve a previously killed project

8.2.2. Decision to bootleg

The chapter 2 showed that the literature suggests a wide range of reasons – often contradictory – for bootlegging. However only a few have been supported by research, e.g : funding systems that do not allow experimental trials (Augsdorfer, 1996); to protect undeveloped ideas (Koch & Leitner, 2008; Cyert & March, 1992; Mezias & Glynn, 1993); to increase feasibility of the idea and gather evidence (Augsdorfer, 2008; Debackere *et al.* 1994; Salomo & Mensel, 2001); to pursue ideas that appear between two planning periods (Augsdorfer 2008; Burgelman & Sayles, 1986); to work outside

the permitted field, escape formal orders and break rules (Koch & Leitner, 2008); to maintain the independence and secrecy of idea (Augsdorfer, 2008) to avoid management interference (Abetti, 1997a); to avoid psychological pressure and not to worry about failure (Augsdorfer, 2008; Koch & Leitner, 2008); disagreement with management (Abetti, 1999b; Pearson, 1997); rejection by management (Abetti, 1997b); and to overcome bureaucratic boundaries (Abetti, 1999a).

To investigate this issue, this research aimed to answer the first research question: why do employees choose to bootleg? In order to answer this question, this research looks into the first steps taken by interviewees when they come up with a new idea, the reasons for bootlegging raised by interviewees, their motivation for bootlegging, and the criteria for pursuing a project underground. In addition, this research presents a framework explaining a decision to bootleg, in Chapter 5. No previous research has studied this issue as comprehensively as this research.

The research shows that when interviewees come up with a new idea, they do not normally start by approaching decision makers to acquire official permission for their project, as there is little hope of getting managerial approval for a recently emerged idea at this stage. However, this does not mean that they initiate bootlegging every time they come up with a new idea.

Interviewees gave several reasons for bootlegging rather than to pursuing an idea formally. First, some interviewees need to produce a feasibility study or proof of concept when they present their ideas to decision makers, so they bootleg to prepare those. This is in line with Debackere *et al.* (1994) and Salomo & Mensel's (2001) argument. Second, some cannot talk decision makers into approving their ideas because decision

makers were unable to understand the idea in its early stages or had a different perspective, which set them against the idea[144] (i.e. uncertainty for decision makers was higher than uncertainty for the bootlegger). A relatively similar discussion is presented by Cyert & March (1992). Third, several interviewees stated that even when they were able to present their idea to a decision maker, they preferred not to do it at the early stage because the likelihood of getting approval for an immature idea was so low, thus they bootleg to develop their idea further to raise their chance of getting official approval. Fourth, other interviewees chose to go underground in order to undertake pre-research activities to either reduce any technical uncertainty about the process of developing the product or process – in literature referred to as uncertainty about the means by Pearson (1997) – or to reduce uncertainty about the end results and its benefits – Pearson calls it uncertainty about the ends. Fifth, where employees have a great deal of freedom to pursue their ideas, they hide them from management in order to avoid psychological pressure until they are certain that the idea will benefit the organisation. Even in this case, it could be inferred from interviewees' comments that the technical uncertainty itself causes psychological pressure; as is also found out by Koch & Leitner (2008). If they are certain that the idea is going to work and benefit the organisation, there is no reason to hide it from management when they have the freedom to explore different directions and ideas.   The final reason discussed by just two interviewees involved reducing market uncertainty about their ideas.

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[144] This research did not find disagreement with management or rejection by management as the reasons for bootlegging even for hardcore bootlegging, nor a psychological need to break rules, etc. Instead, in such cases that might be interpreted by previous papers as disagreement or rejection by management as reason for bootlegging, this research found that although interviewees have a different perspective and understand the issues differently from their managers they go underground to be able to reduce the uncertainty of their ideas to the point that they could be understandable for their management.

The conclusion which can be drawn from these reasons and the examination of the interviewees' circumstances is that all these reasons share one common element: the uncertainty (especially technical uncertainty) at the early stage of innovation. Thus, it can be argued that employees choose to bootleg in order to reduce the uncertainty – mainly technical uncertainty – of their idea, thereby improving their chances of eventually securing management approval to implement the idea officially. The realistic perspective of this research helped to analyse this issue further and discover the underlying element of all these reasons (uncertainty and specifically technical uncertainty), which might be interpreted differently in different circumstances for different projects. This is an issue that was not discovered by previous research although a wide range of reasons – including some of the reasons discovered in this research – has been presented for bootlegging in the literature.

In addition to the reason for bootlegging, there are other elements that influence interviewees' decision to bootleg. One of these elements is the underlying motivation for bootlegging which has not been studied by previous research. This research discovered organisation benefits are the primary motivation. It also unveiled that personal benefits of bootlegging can be considered as the secondary motivation for bootlegging which has been overlooked by previous papers on bootlegging. Personal benefits include tangible benefits; financial benefits – although they are normally insignificant – patent applications and conference and journal papers; and intangible benefits; i.e. gaining respect and recognition, learning and experience, and satisfaction from innovation.

Although the decision to bootleg is not systematically taken, there are several criteria that the interviewees consider to pre-filter their ideas prior to pursuing them underground. These criteria include: the chance of getting official approval, the ability to

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make enough progress underground to convince management and finally the career risks and project risks.

Consequently, when interviewees come up with an innovative idea that could potentially benefit their organisation, they might not be able to acquire official approval at that point. If interviewees thought they could make enough progress to convince management, saw the perspective of getting official approval, and were able to undertake the risk; they would go underground to reduce the uncertainty – especially technical uncertainty – of their idea to secure official approval.

8.2.3. Bootlegging operation

This issue has been discussed by Augsdorfer (1996, 2005) and Abetti (1997a, 1997b, 1999a, 1999b). To study bootlegging operations, this research tried to answer the following research question: how do bootleggers find the time and acquire the resources and expertise to operate clandestinely? It is clear from this research question that this research aimed to study time, resources and expertise used by bootleggers. However, through the course of data collection, it discovered the fourth element that is essential for bootlegging – colleagues' and direct manager's support for bootleg projects that includes protecting the project from interruptions, backing up the project when it is time to present it to management and getting help with acquiring resources and expertise – which has been neglected in previous papers.

Interviewees mainly developed their bootleg projects during official work hours (9am – 5pm) by mixing their official work with their bootleg projects in order to hide them from management. They may stay extra hours and come into work at weekends in order to complete their official work and pursue their bootleg project. These are in line with previous research findings such as Augsdorfer (1996) and Abetti (1997b).

Augsdorfer (1996) claims that bootleggers on average spend 10% their time bootlegging. However, this figure is significantly lower than what is found in this research (26%). This research also found out that bootleg projects on average last over five months underground. Besides, these average values vary for different groups of interviewees; for instance interviewees who work in research units, on average, pursued longer lasting projects than interviewees who work in other units (such as product development) while senior staff and those who work in technology development units spend a higher percentage of their time on bootlegging than other interviewees.

Slack time, specifically time between the end of one project and the beginning of the next, is a common source of time for bootleggers. Some interviewees may be - formally or informally – given some freedom which makes bootlegging easier for them. However, those who have no freedom would create enough room for themselves to bootleg, by charging their time to official projects or pretending to work on official projects. Depending on the type of project, they may also be able to pursue them outside their working environment, as previously theorised by Pearson (1997)[145].

Bootleggers may not need significant resources at the early stage, especially when the bootlegger needs to do more research oriented activities rather than product development oriented work. However, when resources do become an issue – in agreement with a number of previous papers such as Augsdorfer (1996, 2005, 2008), Abetti (1997a, 1997b, 1999a, 1999b), Thompson (1969), Pinchot 1985; Trott (1998), Kanter, 2000; Ma (2002), Richtner & Ahlstrom (2006), Bessant & Tidd, (2007) – this research found that

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[145] Pearson (1997) mentioned that in some industries – such as the software industry – bootlegging is easier, as employees can pursue their project outside their organisation, than in other industries in which R&D activities are limited to the laboratory environment.

slack resources – raw materials, machinery and equipment that already exist in the facility but which are not assigned to any special project – are their prime source.

In addition, this research discovered other methods of gathering resources. These methods include using resources assigned to official projects (as is also highlighted by Abetti, 1999a); charging their costs to official projects; approaching colleagues who have access to the required resources; approaching the direct manager (if they have a good relationship); using special budgets such as "*blue sky budget*" (this was only possible for three interviewees in exceptional circumstances). Estimations of the costs of bootlegging to the organisations – gained by this research – seem to be very insignificant in comparison to R&D budgets which confirms Augsdorfer's (1996) finding in this regard.

While previous papers claim that bootleggers may approach their colleagues to acquire expertise (Abetti 1997a, 1997b, 1999a; Augsdorfer 1996, 2005; Hellstrom & Malmquist, 2000), this research found that they approach not only their colleagues – in R&D, product development, production and marketing – but also people from outside the organisation – customers, suppliers, scientists in universities – and their direct manager, to acquire expertise and support. The roles played by these participants vary. Most participants, particularly outsiders, simply give technical advice. Insiders, particularly senior staff, are important as they support the project when the bootlegger reveals it to decision makers. Senior employees and middle managers generally involve more contributors in their projects than junior staff, though only a small proportion of these participants spend time working directly on the project. This type of project is normally pursued by senior staff or middle managers who can take advantage of the networks they have built over the years whereas, junior staff tend to work on their bootleg projects on their own.

Augsdorfer (1996) mentioned that mutual trust is the criterion bootleggers consider before approaching their colleagues to acquire expertise. This research has generated new insights in terms of the criteria bootleggers apply when choosing collaborators. Bootleggers approach people within their personal network primarily based on the projects and previous experience of working together which determines whether they have the required expertise and are trustworthy.

Finally, this research investigated the advantages and disadvantages (limitations) of bootlegging process in comparison to official process. The advantages of the bootlegging process comprise: being a fast way of pursuing an idea (at least at early stages); having freedom to explore different directions (that may not be possible through official process); avoiding interruptions (especially from management) which makes the process more creative or innovative; being more interesting, exciting and/or innovative; and avoiding pressure to come up with results. On the other hand, the limitations of bootlegging include: lack of resources and lack of managerial support; being cautious about approaching people and asking people to help; undertaking risk and being responsible (even after the idea is officially approved); convincing management that the idea is worth spending time and resources on in the end; and finally lack of direction.

8.2.4. Bootlegging disclosure

Previous research has barely discussed the disclosure stage of bootlegging. Those who have discussed this issue have claimed that bootleggers are driven to reveal their project when the need for resources and managerial support make it necessary (Augsdorfer, 1996; Koch & Leitner, 2008); when they can show the benefits of their ideas (Dickson *et al.* (1991); or when they reach the point that their projects are understandable to the management (Burgelman, 1983). In terms of how far bootleggers go underground, there

is also a disagreement in the literature. Augsdorfer (1996, 2005) found out that once the feasibility of the idea is proven bootleg projects are normally revealed. In contrast, Pinchot (1988) says there is no rush to disclose the bootleg project and Abetti (1997b) discuss bootleg projects that last underground until the end of development process and highlights that bootleggers wait for a precipitating event to reveal the project. It seems that each of these papers has captured a part of the disclosure process and not the whole picture.

Since a variety of contradictory issues have been raised in the literature, to investigate the disclosure stage of bootlegging this research focuses on the following research question: what are the factors that cause bootleggers to reveal their clandestine projects?

This research comes up with a significant discovery with regard to bootlegging disclosure. It finds that bootlegging disclosure normally occurs in different steps: first approaching the direct manager – transition from true bootlegging to quasi-bootlegging – and second presenting it to the decision makers. Different factors influence interviewees' decision to take each of these steps. This has been hidden from the eyes of previous researchers.

To take the first step – approaching the direct managers – getting satisfactory results is essential. It was shown that when bootleg projects failed to deliver the expected results they would be buried underground. The limitations of bootlegging and bootleg project needs – time, resources, expertise and support – are other elements that impact on the decision to take this step. Beside, having a good relationship with the direct managers based on mutual trust and understanding is a crucial element. It must be highlighted that approaching the direct manager alone does not usually mark the end of bootlegging – however it is the transition from true bootlegging to quasi-bootlegging. From this point, the direct manager plays a significant role in the bootleg project and is able to influence

the project. This step of revealing bootleg projects and direct managers' roles have not been discussed in previous literature.

The second step – which is the actual disclosure stage – is to present the project to the decision makers. Interviewees take this step when they are sufficiently confident that they will be able to convince the decision makers and secure official approval – this is also highlighted by Burgelman (1983). In other words, when the uncertainty surrounding the innovation (the fundamental reason for bootlegging) has been overcome, interviewees have no reason to bootleg. So the first element that influences their decision to disclose bootlegging is fulfilling the primary reason for bootlegging. The second element, which was previously spotted by Augsdorfer (1996) and Koch & Leitner (2008), is that bootleg projects often reach the point where further progress underground is impossible. They must become official in order to progress any further; for instance, to get implemented. Finally, finding the right moment (or a particular event) to present the project to decision makers is another element which varies from one project to another.

If the interviewee does not have a good relationship with his/her direct manager, s/he may go behind the direct manager's back and approach a senior manager directly to gain support for the project. Besides, in those cases where the direct manager of the interviewee is also the decision maker, these two steps are combined. Since these two steps were not identified in previous papers, neither these situations were discussed.

Disclosure of bootlegging may occur at different stages of development. The majority of bootleg projects are revealed once the proof of concept or feasibility study is completed, this confirms Augsdorfer's (1996, 2005) findings. If the project is pursued by a senior staff or a middle manager, it might be pursued even further and it might be prototyped underground. In addition, significant progress could be made underground if the nature

of project is software development. These also can be considered as new discoveries of this research.

8.2.5. Outcomes of bootlegging

In terms of outcomes of bootlegging, it is mentioned that there is disagreement in the literature over whether bootlegging results in radical or incremental innovation. Augsdorfer (1996, 2008) highlights that bootlegging rarely results in radical innovation whereas a wide range of literature emphasises bootlegging as a method of achieving radical innovation – e.g. Knight (1967), Burgelman (1986), Burgelman & Sayles (1986), Robert 1991; Freeman, 2000; Ma 2002; Granthams & Readman (2005), Berend *et al.* (2007) and Amabile & Khaire (2008). In addition, Abetti (1997a, 1997b, 1999a, 1999b, 2004) discusses bootleg projects that result in radical innovation. However, only Evink & Beam (1999) and Berends et al. (2007) give knowledge creation as a benefit of bootlegging. It should be emphasised that management literature does not discuss any benefit for projects that do not result in innovation. Thus, the fourth research question that this research was set to answer was: what are the tangible and intangible outcomes of bootlegging?

In contrast to previous literature that neglected failed examples of bootleg projects and only focused on successful bootleg projects, this research investigates the outcomes of wide range of projects including those that resulted in valuable innovation and those that have no outcomes. A significant proportion of bootleg projects observed by this research did result in innovation.

Bootlegging projects that resulted in innovation mainly led to improvements (from slight to significant) in existing products or processes. It is rare that a bootleg project results in product or process that is new to the market, industry or even to the company. Moreover,

they are mainly based on applications of new or existing technology; in a few cases are they based on proprietary technology. This research found that bootleg projects rarely resulted in radical innovation, their main outcomes are incremental, modular and architectural innovation. In general, innovation resulting from bootlegging has more characteristics of incremental innovation than radical innovation. Thus, it is not logical to expect bootlegging to result in radical innovation.

Bootleg projects that fail to directly result in innovation may have other benefits. They may result in invention (meaning their outcomes have been patented but not yet implemented in the organisation); knowledge creation and learning (their outcomes have been published as conference papers and shared with interviewees' colleagues and conference attendees); – and problem solving (when the outcome is not novel enough to be considered as innovation). There are also bootleg projects that did not have any benefit for the organisation as they got rejected once they were presented to decision makers or they were stopped at early stages. Thus, bootleg projects, as official projects, may also fail to benefit the organisation.

8.3. Contribution to Knowledge

The literature review demonstrates that only a handful of studies have been carried out in this area and they are mainly case studies of one or a few successful projects. The limited theories developed in the literature are either not supported by evidence or they contradict each other. This section reviews the areas in which this research has made significant contribution to knowledge.

8.3.1. Reasons for bootlegging

As previously mentioned, a wide range of reasons for bootlegging can be found in management literature; a few of which are supported by empirical evidence, such as: lack of managerial control (Knight, 1967), funding systems that do not allow experimental trials (Augsdorfer, 1996); to protect undeveloped ideas (Koch & Leitner, 2008; Cyert & March, 1992; Mezias & Glynn, 1993); to increase feasibility of the idea and gather evidence (Augsdorfer, 2008; Debackere *et al.* 1994; Salomo & Mensel, 2001); to pursue ideas that appear between two planning periods (Augsdorfer 2008; Burgelman & Sayles, 1986); to work outside the permitted field, escape formal orders and break rules (Koch & Leitner, 2008); to maintain the independence and secrecy of idea (Augsdorfer, 2008) to avoid management interference (Abetti, 1997a); to avoid psychological pressure and not to worry about failure (Augsdorfer, 2008; Koch & Leitner, 2008); disagreement with management (Abetti, 1999b; Pearson, 1997); rejection by management (Abetti, 1997b); and to overcome bureaucratic boundaries (Abetti, 1999a). In addition, there are other reasons presented in the literature that are not supported by empirical evidence; some of these reasons contradict each other; for example: tight managerial control is considered by Thompson (1969) to be a reason for

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bootlegging while Knight (1967) attributes it to lack of managerial control. This highlights the knowledge gap in this regard.

This research rejects some of previously discussed reasons such as disagreement with management or rejection by management. Instead, it confirms others by finding relatively similar reasons such as the need to produce a feasibility study or proof of concept, not being able to convince management to approve the project, having an immature idea, the need to undertake pre-research activities and to avoid psychological pressure to show a valuable result.

This research takes a further step – that has not been taken by previous research – to investigate why different reasons are raised by different interviewees. In-depth analysis of data showed that the unique underlying element for all discovered reasons is uncertainty (mainly technical uncertainty) surrounding emerging ideas. This is a significant contribution of this research to knowledge.

The research also shows that this underlying element is interpreted differently for different projects pursued by different bootleggers because of the projects' characteristics and the interviewees' circumstances. This discovery explains why a variety of reasons for bootlegging are perceived while they all share one underlying element, uncertainty. This is significant contribution of this research as it has not been explored by previous research on bootlegging.

8.3.2. Motivation for bootlegging

Motivation for bootlegging is a subject that has never been the main focus of previous studies. Previous papers, as discussed in the last subsection and the literature review chapter, only discuss reasons for bootlegging. Although previous research – e.g. Abetti (1997a, 1997b, 1999a, 1999b, 2004), Augsdorfer (1994, 1996, 2005, 2008) – argue that

the purpose of bootlegging is to benefit the organisation, there is no mention or discussion about the motivation driving this activity in the literature.

This research thoroughly investigated what motivated the interviewees to undertake such risky activities. The interviews revealed that the primary motivation for bootlegging was to carry out works that benefit the organisation. In addition, it also identified personal benefits – an issue that has been completely neglected in previous research – as the secondary motivation for bootlegging.

8.3.3. Criteria for pursuing a project underground

Another significant contribution of this research with regard to the decision to bootleg is identifying the criteria for choosing an idea to be pursued underground. The literature showed that neither empirical nor theoretical papers that discussed bootlegging covered the issue why some of projects are pursued underground and not others[146].

This research discovers that the interviewees would not necessarily initiate bootlegging every time they come up with a new idea; there are certain criteria that are considered by employees prior to initiating a bootleg project. Chapter 5 demonstrated that in order to pursue a project underground; the idea must have a good prospect of eventually getting official approval. Also, the bootlegger must be able to make enough progress underground using limited time, resources and expertise, and s/he must be able to assume the risk involved in the project. This significantly improves our understanding of the beginnings of bootleg projects and the decision to go underground.

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[146] The literature is limited and suggest a several– often contradictory – reasons for bootlegging and it ignored the criteria for pursuing a project underground.

8.3.4. Disclosure of bootlegging

The existing literature has a little to offer in regards to disclosure of bootlegging. Several papers that discuss this issue propose different perspective so it seems that each of them has grasped only a part of the picture. Augsdorfer (1996, 2008), Koch and Leitner (2008) found that the bootleg project is revealed when further underground progress is impossible, while Dickson *et al.* (1991) suggested that once it was possible to show the benefits of the project, this would bring an end to the clandestine process. There is a lack of consensus in the research, also it is not able to tell us how bootlegging is revealed and what take place at this point.

This research makes major contributions to knowledge by presenting the framework that explains the disclosure stage of bootleg projects. First of all, we discovered that the process of disclosure mainly occurs in two steps and different elements influence the decision to take each step; an issue that has not been observed in previous papers[147].

The first step is approaching the direct manager (who is not normally the decision maker). For the first time in the innovation management literature, this research showed that the direct managers got involved mainly to support bootleg projects after they were consulted. The role of direct manager and his/her influence on clandestine project had not previously been identified. This research has made a contribution by demonstrating that middle managers may get to know about the existence of bootleg projects prior to the senior managers and decision makers and therefore they may be able to influence the

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[147] This research was only able to discover the two stage of bootlegging disclosure because it thoroughly investigated circumstances in which bootlegging occur. This enabled the researcher to distinguish between the direct manager of bootleggers and the decision makers who are in charge of approving or rejecting employees' ideas.

projects prior to them being disclosed to the whole organisation. The research also points to several elements that influence the decision to take this step including getting satisfactory results; requiring resources, time, expertise and support; and having a good relationship with the direct manager. Such an inclusive comprehension of the disclosure stage of bootlegging is unique in the innovation management literature.

The second step was presenting the project to the decision makers, the main step of the disclosure. Interviewees take this step when the bootleg project reaches the point where further progress underground is impossible and they are sufficiently confident that they will be able to convince the decision makers which means the uncertainty surrounding the innovation (the fundamental reason for bootlegging) has been overcome. Identifying this as the main step of bootlegging disclosure and the elements that influence bootleggers' decisions to take such a crucial step is another element that has been overlooked by previous authors.

Moreover, exceptions to this scenario (two step disclosure) have thoroughly been explained in this research. One exception is when the bootlegger does not have a good relationship with his/her direct manager, so s/he may go behind the direct manager's back and approach a senior manager directly to gain support for the project. While the second exception is in cases where the direct manager of the interviewee is also the decision maker in which case the two steps are combined. So this research makes another contribution by explaining how the organisation structure and bootlegger's relationship with their direct manager influence disclosure of bootlegging. Not only is the whole idea of two steps disclosure and it exceptions a unique discovery of this research but this research also demonstrates how diversely bootleggers behave based on the circumstances in which they operate and this is an issue that has not been outlined previously.

There is no evidence of researchers studying failed bootleg projects in the literature. This research includes several failed bootleg projects and discovered that those bootleg projects failing to deliver innovative outcomes would be buried underground and never disclosed despite the fact that they might have other benefits for the organisation.

Finally, in terms of how far bootleg projects would develop underground there is marked disagreement in the literature. Augsdorfer (1996, 2005) outlined that once the feasibility of the idea is proven, bootleg projects are normally revealed. While, Abetti (1997b) takes a contrary position, he found projects where most of the development time was carried out underground and Pinchot (1988) contends that bootleggers do not rush to disclose their bootleg project.

This research discovered that most bootleg projects are revealed once the proof of concept or feasibility study is completed and in fact there is then no reason to continue an underground process. It also demonstrates that there are some exceptions in which bootleggers operate in very specific circumstances, such as those in product development, where they can easily hide their project and there is a little need for resources and other expertise that limit underground process. Therefore, this research was able to present a clear explanation for the disagreement existing in the literature; this is considered to be contribution of this research to knowledge.

8.3.5. Outcomes of bootleg projects

Augsdorfer (1996, 2005) found incremental innovation as the main outcome of bootlegging although the majority of papers (including empirical and theoretical papers) discussing bootlegging, underground innovation, skunk works, and ambidexterity seem to expect radical innovation as the main outcome of bootlegging, e.g.: Abetti (1997a, 1997b, 1999a, 2004), Amabile and Khaire (2008), Berends *et al.* (2007), Evink and

Beam (1999), Fosfuri and Ronde (2007), Freeman & Soete (2000), Grantham and Readman (2005), Knight (1967), Peters and Waterman (1982), Roberts (1991) and Salomo and Mensel (2001). It could be argued that this is because these papers are drawing their conclusions based on one or few extraordinary cases where clandestine activities resulted in radical innovation. Therefore, there is also a disagreement on the type of innovation that normally results and can be expected to result from bootlegging in the literature.

This research thoroughly evaluated bootlegging outcomes, which resulted in another contribution to knowledge. First of the, research discovered bootleg projects that result in process innovation as well as product innovation this is an issue that there is no trace of in the literature.

The research examined the type of innovation that came out of the bootleg projects investigated. Only in a few cases did bootlegging result in a new product or process for the company, even in these few cases the products and processes resulting from bootlegging were not new to the market or the industry. Therefore, bootlegging rarely results in radical innovation. The research concludes that types of innovation that normally result from bootlegging can be categorized as incremental, modular and structural innovations.

In addition, a significant number of bootleg projects, observed by this research, failed to result in any innovation despite this being their primarily purpose. Interestingly, these failed projects often have other outcomes such as invention, problem solving and knowledge creation and learning. Previous studies of bootlegging and underground innovation did not investigate those failed bootleg projects that are not revealed, and so were not able to investigate their benefits.

8.3.6. Stage of product development in which bootlegging occurs

Innovation management literature – especially creativity and fuzzy front-end (FFE) papers e.g. Salomo & Mensel (2001) and Koch and Leitner (2008) – portray bootlegging as limited to the early stages of innovation. In agreement with them, Augsdorfer (1997) and Debackere *et al.* (1994) briefly portrayed bootlegging as technology-pushed projects that happen during the early stage of innovation – this is one of the issues that is briefly covered in the literature.

One of significant discoveries of this research is finding both technology-pushed and demand-pulled bootleg projects initiated and carried out throughout the innovation process – presented in section 4.7 of the chapter 4. First, it discovers bootleg projects that are based on new ideas which normally occur in early stage product development – this confirms previous papers' arguments. However, this research came up with two other types of bootleg projects: bootleg projects that are part of official projects – which may occur throughout the product development process and bootleg projects that retrieve projects that are already completed or abandoned. For instance, it was shown that for those organisations which apply a stage-gate process, bootlegging that pursues part of an official project underground may occur at different stages of stage-gate process and circumvent some gates. In addition, bootleg projects that pursue previously developed or abandoned projects may even occur after completion of a development stage; e.g. even after the related product hit the market.

Therefore, an important contribution of this research is to illustrate that bootlegging can take place throughout the innovation or product development process – not just at early stages – and even after the completion of a formal process. It was also shown that when bootlegging occurs in organisations that apply stage-gate processes, it modifies,

interrupts and circumvents some stages or gates. This clearly not only improves our understanding of the nature of bootleg projects but also raises a subject that can be studied by further research.

8.3.7. Understanding how bootleggers operate underground

How bootleggers operate clandestinely – mainly in term of using time, resources and expertise - has been briefly touched upon in previous research. Augsdorfer (1996, 2005, 2008), Abetti (1997a, 1997b, 1999a, 1999b), Thompson (1969), Pinchot 1985; Trott (1998), Kanter, 2000; Ma (2002), Richtner and Ahlstrom (2006), and Bessant and Tidd, (2007) see slack resources as vital for any underground activities. However, Pearson (1997) and Nijhof *et al.* (2002) believe slack resources are not required for bootlegging. In addition, Abetti (1997b, 1999a) claimed that if bootleggers need to, they may steal the required resources for bootlegging. Considering the complexity of the clandestine options is a subject that has not hitherto been explored in sufficient detail.

This research found that bootleggers may use a variety of methods to gather the required resources they need for their bootleg projects. They use slack resources however if they are not adequate, they may divert resources assigned to official projects to their clandestine projects. They also may approach their colleagues and their direct manager to get the required resources. Therefore, the model for underground operation presented by this thesis is significantly more comprehensive than previous models and includes a variety of issues that have not been touch upon by previous papers.

The only papers which discussed the time used for bootlegging are those authored by Augsdorfer (1996 & 2008) which claim bootleggers spend on average 5 to 10 percent of work time on bootlegging. Strangely he did not find any significant differences among different bootleggers in terms of the time they spent on bootlegging. Besides, as was

discussed in chapter 2, there are serious concerns regarding the statistical validity of Augsdorfer's average values.

This research found out that bootleggers on average spent 26% of their work time on bootleg projects – which is significantly higher than the average value Augsdorfer proposed. Besides, it was found that bootleg projects on average last over five months underground. In addition, this research highlights that these average values vary for different groups of interviewees, which is an issue that has not been explored previously. It discovered that interviewees who work in research units, on average, pursued longer lasting projects than interviewees who work in other units while senior staff and those who work in technology development units spend a higher percentage of their time on bootlegging than other interviewees. These discoveries significantly improve our understanding of the time spent on bootleg projects.

8.3.8. The roles of other participants

Unofficial networks of bootleggers are highlighted as the main path for getting the expertise required for underground projects (Augsdorfer, 1996; Abetti, 1997b, 1999a; Hellstrom and Malmquist, 2000; Koch and Leitner, 2008, Rosenau, 1988). This research make another contribution to knowledge by discovering that getting required resources and expertise are not the only reasons that people approach their colleagues, friends and their direct manager. Bootleggers may also approach other people to get the required support for their bootleg projects specially before revealing their bootleg projects. This is another issue that has been overlooked by previous empirical and theoretical papers.

This research also investigated roles that are played by the people who are approached by bootleggers; a subject that has not been covered in the literature. It demonstrates that in bootleg projects initiated by normal staff, participants' roles are normally limited to

giving advice or backing up the project when they want to reveal their bootleg project to decision makers. Whereas in projects pursued by middle managers or senior staff who have a broader network of contacts and influence and often have some people who report to them, they can have others to work directly on their clandestine project. This is another contribution of this research to knowledge that can clearly demonstrate how participants, coming from different units or even outside the organisation, contribute to bootleg projects.

Finally, Augsdorfer (1996) emphasises that bootleggers choose these participants based on mutual trust between them. This research also thoroughly investigates this issue and outlines that bootleggers approach people primarily based on the bootleg project's needs and previous experience of working together which determines their experience and trustworthiness. Consequently, as is clear from discussion above, in every aspect of underground operation, this research presents comprehensive information that dramatically improves our understanding of bootlegging.

8.3.9. Bootlegging advantages and limitations comparing to official processes

In general, papers on bootlegging have a positive attitude toward it however there is little that can be found on the pros and cons of bootlegging compared to official projects. The only study that compares these two is Abetti (1997b) – based on a case study – which highlights that securing resources is the biggest challenge to an underground operation. In addition, Roussel *et al.* (1991) – in their theoretical book – are concerned that underground activities might go out of control. On the other hands, skunk works literature embraces some pros and cons for clandestine operation compared to official process. These advantages are having autonomy (Peters and Waterman, 1982), and

avoiding bureaucracy Peters (1983). It also includes the following disadvantages: risk of failure (Peters and Waterman, 1982; Dougherty, 1992; Paxton, 2006), developing impractical products (Evink and Beam, 1999), difficult reintegration with on-going business (Rafii, 1995) setting unrealistic targets (Nijhof *et al.* 2002) and not sharing information and knowledge (Dougherty, 1992).

While there is just a little on this issue in bootlegging and underground innovation literature, it was important to see whether the advantages and disadvantages mentioned for skunk works are also relevant to bootlegging. This also helps to confirm our findings regarding the decision to bootlegging and the disclosure of bootlegging.

A number of advantages are discovered in this research when comparing clandestine operations vs. official process. These advantages include: not facing bureaucratic boundaries; freedom to explore different directions that cannot be tried officially; not facing interruption and distraction specially from management; being more exciting, challenging and/or innovative than official projects. Although some of these advantages can be found in the papers that briefly discuss bootlegging as the reasons for bootlegging, this research clarifies them as the advantages of the bootlegging process as distinct from the reasons for bootlegging. Therefore, this research makes a contribution to knowledge in this regard by removing an ambiguity existing in the literature that confuses reasons for with advantages of bootlegging.

In addition, this research illustrates some drawbacks of bootlegging which include resource limitation, lack of managerial support, difficulty getting managerial buy-in, assuming risk and responsibility, taking longer and time limitation, difficulties in approaching those who have the required expertise, waiting time and not having results if the project fails, and lack of direction. Although the literature mentions these issues, this research not only identifies them as critical limitations of bootlegging but also

emphasizes that these limitations often become too problematic and make bootleggers

consider revealing their projects. Thus, in terms of bootlegging limitations, this research

makes another contribution by demonstrating concerns regarding bootlegging that have

been underestimated in the literature.

8.4. Research Implications

This research has implication for academia and management; this section covers the major practical implications for both groups.

8.4.1. Implications for academia

For researchers, this research sheds light on aspects of the innovation process that were critically under-researched. Thus, this research has a number of implications for this group which include:

- Researchers who study innovation must be aware of the possibility of bootlegging's existence throughout the innovation process. As shown by this research, bootlegging occurs at different stages of innovation and is not limited to the FFE of innovation. Bootlegging, as was shown in chapter 4, challenges the stage-gate process by creating loops and/or circumventing some stages and gates. This is further evidence that rigidly structuring the innovation process, as is done in linear and recursive approaches, may not be possible in practice.

- The expectations for clandestine and informal activities such as bootlegging to result in radical innovation, as posited in the literature, seem to be unrealistic. It seems that management literature has focused on exceptional cases in which bootlegging; and other similar clandestine activities; resulted in radical innovation. Academics must be more mindful of the fact that such exceptional cases seem to be more appealing to many people rather than cases in which bootlegging results in incremental innovation, problem solving, knowledge creation and learning.

- This research also is a good example of studying an issue that for years has been considered difficult to study because of the nature of the research subject, which is a clandestine activity and hence a rather sensitive topic. By applying the right methodology which has been used in other branches of social sciences to study sensitive topics, the research shows that to really understand or research a clandestine activity, it is necessary to adopt a different research methodology instead of relying on just case studies and postal surveys. Thus, it can be argued that management researchers must not limit themselves to the standard methodologies. There is a great opportunity to learn from other branches of social sciences to expand our knowledge.

8.4.2. Implications for management

Having practitioners and management in mind when this research was designed, it has come up with several implications for management. The fundamental elements of this research's implication for management is to raise awareness about bootlegging and to specify elements which managers could manipulate to influence bootlegging even though, they might not be able to observe, manage or control it.

Before discussing research implications for management, the characteristics of our research sample must be highlighted. This research focused on bootleg projects pursued by some of the most educated and well-experienced engineers and scientists who work in research labs or technology development, R&D and product development units of high technology companies. As discussed throughout the thesis, these people are highly motivated and have the best interest of their organisation at heart. They also have a relatively good understanding their organisation's business strategy and how things work in their organisations. Therefore, this research's findings and its implications cannot be

generalized to every employee. The recommendations and practical implications of this research must strictly be limited to those innovative scientist and engineers with similar characteristics who work in similar environments and deal with high level of uncertainty in their work. The implications of this research for management include:

- Managers must be aware of the fact that although they may not be able to see bootlegging, there might be bootleg projects going on throughout their product development processes. Structuring innovation processes; e.g. budgeting time and controlling resources; does not stop bootlegging.

- The only element that seems to negatively influence bootlegging and limit the chance of bootlegging is to reject employees' ideas out of hand without proper explanations or to ignore them. Thus, as long as managers respect their employees' ideas, innovative employees continue to bootleg in order to reduce the uncertainty and increase the likelihood of their ideas getting official approval. If managers did not respect their employees' ideas and innovative attempts – e.g. rejected their employees' ideas out of hand without proper explanations – not only did this create disappointment among the most creative and innovative employees but it also resulted in missing chances and opportunities. In other words, it discourages employees from pursuing their ideas underground. Therefore the organisation will miss a great many opportunities which may not necessarily be comprehensible for the managers but can potentially be spotted by their well-educated and experienced employees.

- One of the criteria that is considered by bootleggers when they want to pursue a project underground is the possibility of getting official approval. They learn how their ideas are assessed by the management and pre-filter their ideas before going underground. Thus, if management wants to have effective bootlegging, they need to

clarify how they judge employees' ideas and give them feedback why they accept or reject their ideas. Then the employees will be able to make better choices when deciding whether to pursue a project underground.

- The motivations for bootlegging discovered in this research clearly demonstrate that the organisation's benefit is always a priority for these bootleggers although they also see some personal benefits in bootlegging. While personal financial benefits are not a strong motivation for pursuing innovation instead there are organisation benefits and intangible personal benefits that push bootleggers to undertake risk and pursue their innovative ideas. The sense of satisfaction gained from creating something new and the good reputation and respect that they get from benefiting the organisation are the most crucial personal motives for them. Thus, it is important to emphasise that respecting innovative ideas and the attempts of well-educated, experienced and innovative employees in research and development units could be the best way to motivate these people.

- The fundamental element that is the underlying cause of all reasons for bootlegging: uncertainty and in particular technical uncertainty. Therefore, bootlegging seems to be a low cost method of reducing uncertainty about some ideas and opportunities that might not necessarily be recognised by the management or which cannot be pursued through the official process. This research clearly showed the benefits of bootlegging for organisations however that does not mean it supports an approach where managers allow all their employees to have time to bootleg; the creation of a 'permitted bootlegging' environment is not supported because this specific type was not the subject of this research.

- Considering the time and resources used for bootlegging, it can be argued that the cost of bootlegging for an organisation is relatively insignificant when it is compared

to the overall R&D expenditure. Therefore, bootlegging can be seen as low cost efforts to pursue creativity and gain innovations that might not be gained through official channels. Thus, there is no need to be concern about bootlegging or try to stop any clandestine activities in research and development units. It must be highlighted that the research shows that bootleggers do not need to be encouraged by management as they have their own motivation as was previously discussed.

• Slack time and resources seem to be main channels for acquiring bootleg projects' needs. This research clearly showed that when slack resources and time either do not exist or are not adequate, bootleggers start to use time and resources assigned to official projects. Thus, tightening up time and resources on official projects and limiting slack resources would not reduce bootlegging but would make bootleggers redirect official projects' time and resources to their clandestine projects. This must not be interpreted as this research recommending managers to increase slack in order to have permitted bootlegging. Instead, it emphasises that lack of slack would result in diversion of official projects resources and time to clandestine projects whereas if there is some slack in the system it motivates employees who are keen to take advantage of it for the organisation's benefit to do so.

• Senior management can expect to find out about bootleg projects once the projects have reached the point where the managers can understand the project or be persuaded. If the project fails, they will never hear about it. However, those mid-level management who directly work with research, technology development, R&D and product development employees – who are not in position to approve or reject projects – would be consulted about bootlegging if they have a good relationship with their direct reports. So they not only know more about clandestine projects in

their units than senior management and decision makers but are also able to influence bootleg projects before they are revealed.

- Presented with an accurate understanding of both the benefits and costs of bootlegging in this research, decision makers can decide whether it is worth giving employees the freedom to bootleg. This research shows that radical innovation is not the common outcomes of bootlegging although there are some expectations of it so being. Even when radical innovation occurs, it should not be expected to result in totally new products or processes in the market or industry. It seems that employees are not able to take the huge risk of chasing radically diverse ideas that potentially can result in radical innovation.

Looking at the pros and cons of bootlegging in comparison to official projects, this research reached the conclusion that if the management accepts the fact that there is a risk of failure for bootleg projects – as there is for official projects – and creates a more relaxed environment, employees will feel comfortable in taking the risk to pursue those emerging ideas that they cannot seek official approval for. Having said that, in order to have more effective bootlegging, it is essential to give employees some direction and guidance such as explaining why some ideas are accepted and some get rejected. If innovative employees have a clear understanding of the strategic direction of their company and know how their projects are assessed then when they decide to pursue a project clandestinely, they will choose a project that will have higher chance of being accepted by the management. Let's bear in mind though, that by recommending giving clear direction and explaining how employees' ideas are assessed this research is not recommending managers to encourage bootlegging in their units and organisation; those who undertake bootleg projects do not need to be encouraged by management.

8.5. Recommendations for Further Research

This research investigated bootlegging from the employees' point of view. Further research may study bootlegging from a management perspective. For instance, it may consider how different levels of management perceive the existence of bootlegging in their organisation, what they do to control or promote bootlegging, and whether they consider bootlegging to be beneficial for their organisation.

Further research may investigate bootlegging in other industries and/or organisations, units or departments that have not been covered in this research. In addition, undertaking survey and/or face-to-face interviews with larger samples would probably help to study some of the issues that this research was not able to touch on. For example, the difference in the nature of bootleg projects pursued by different group of bootleggers who have different positions or responsibilities can be a potential research project.

Another idea that would be significantly beneficial for future research is to investigate bootlegging contributions to some organisations' innovations especially bottom-up innovation. Further research may take a sample of innovation cases – for instance in an organisation – and then by going back through the history of those innovations with those who were involved in the projects investigate how many of them have resulted from bootlegging and how much of those were pursued underground.

It would also be valuable to study management perceptions of bootlegging by surveying different level of managements' awareness of bootlegging in their organisation. Such research can also investigate the influence of management understanding and perception of bootlegging on bootleg projects.

The process of reincorporation into the mainstream business for bootlegging projects after disclosure and their challenges is another issue that may be expanded by further research. As bootleg projects are developed in isolation, reincorporating them into the mainstream business of the organisation may be challenging. Few issues, in this regard, were encountered in this research, however they could be further investigated as they were not the focus of this research.

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Appendixes

I. Preliminary Research Design and Its Limitations

This section discusses preliminary research design considered for this project. It also covers the limitation that this research design encountered and the need to revise it.

Among the different methods of data collection used for realist research projects – survey, interview, ethnography and case study – multiple case studies was the method initially chosen for this research. It was assumed that multiple case studies would be the most appropriate method for this research and also it is in line with the chosen research strategy.

Conducting case studies would enable the researcher to gain a deep understanding of the context in which bootlegging happens (Robson, 2002). It also helps to study formal and informal procedures in organizations (Hartley, 1993). In addition, case studies have the advantage of studying a phenomenon – in this case bootlegging – in its "*real-life*" context to see what elements influence it (Yin, 2003). It is also possible to use different sources of data and different methods of data collection, which help to triangulate data (Yin, 2003). It must be emphasised that considering the philosophical perspective and the research strategy, multiple case studies initially seemed to be the most appropriate research methodology for this research.

Consequently, having chosen the multiple case studies as the research method, a case study protocol was developed – based on Yin's (2003) recommendations – to collect data from different sources. The case study protocol was designed to undertake semi-structured interviews with senior managers – who are decision makers in regard to R&D decisions – middle level managers – who are directly engaged in R&D activities – and R&D staff who were involved in bootlegging. As a part of the case study protocol,

the research would also study R&D documents and archives related to the bootlegging cases discussed by participants.

In order to ensure that the protocol was properly developed, a pilot-study was undertaken. Primarily this pilot study was set to test the case study protocol and to improve the content and procedure of the research plan. Considering the difficulties involved in the study of clandestine activities reinforces the importance of undertaking a pilot-study.

I.1. First pilot study

To undertake the first pilot study, the researcher used his personal network to find four companies that were willing to participate. Thus, four case studies were conducted with four middle size companies from the software, pharmaceutical, chemical and advertising industries, enabling the investigation of bootlegging in different organisations and industries. The four case companies were all American corporations with at least one R&D department.

In each organisation, a senior manager – vice presidents of R&D or product development – who had a significant role in making decisions in regard to R&D projects and budgeting, were interviewed first. This was done in order to establish senior managers` perceptions and understanding of bootlegging in their firms. Then an R&D director was interviewed in each company; they were asked to describe the extent of bootlegging in their departments and to identify any suspected bootleggers among R&D staff at the end of interviews. Finally, those suspected of bootlegging were interviewed. In total, across the four companies, four senior managers, four R&D directors and eleven R&D staff were interviewed. On average, interviews lasted

between 25 and 60 minutes. The number of R&D staff interviewed and the number of

bootleg projects discussed with them are shown in Table A.1

		Table A.1: Research sample			
Company Code	Industry	Senior management interviewed	Middle manager interviewed	No. of R&D staff interviewed	No. of bootleg project discussed
A	Pharmaceutical	1	1	3	4
B	Chemical	1	1	3	3
C	Software	1	1	3	4
D	Advertising	1	1	2	2

An unsuccessful attempt was made to gain access to the R&D documents and archives

to gather more information and see if there were any record of bootleg projects. Mainly,

the R&D managers who were interviewed refused to give access to their R&D

documents because either they could not share technical information about their

projects with an outsider or they thought there were no records of bootlegging in their

documentation and so there was no need to go through their archive.

The data analysis process was undertaken in two steps. In the first step, data collected

for each firm was separately analysed. Then, cross-case analysis was undertaken which

enabled the researcher to compare data collected from each case to identify similarities

and differences in relation to bootlegging across the four organizations. Substantial

similarities supported the validity of the findings, whereas major differences provided

the opportunity to compare the activities which are classified as "bootlegging" in

different firms or industries. The collected data for this study was used to write a

conference paper that was presented in EurOMA 2009 in Sweden.

I.2. Pros and Cons of chosen methodology and need to revise it

There were several unexpected challenges to face during the data collection and analysis process that showed the need to change the research method. On the other hand, this method had some strengths that should not be neglected.

Face-to-face interviews with R&D staff were a great success. First, they enabled the researcher to gain interviewees` trust and ask sensitive questions. Second, because it was not easy to differentiate between the various types of bootlegging (e.g. unofficial and sanctioned projects); this method enabled the asking for further clarification about interviewees' comments. Third, the researcher was able to capture interviewees' reactions to questions.

In spite of our concerns that R&D staff would be reluctant to talk about their clandestine activities, those interviewed were happy to proactively contribute to this research and discussed bootlegging openly. However, while they were comfortable talking about previous, now exposed, bootleg projects, they were more hesitant about discussing ongoing bootleg projects.

The main limitation of this method was that R&D staff only discussed their successful experiences and did not talk about their failures. Since they were approached by the researcher through their organisation and specifically through their management, it could be inferred from their responses that they were concerned whether the researcher would share any information gained with their management. Thus, they were careful about their comments as they thought the interviewer might share his findings with their management. Although the researcher assured them that he was obliged to maintain confidentiality, gaining their trust was a challenge. Beside, the researcher had the

impression that R&D staff exaggerated the extent and significance of their bootleg projects.

On the other hand, interviewing management did not reveal any significant information about bootlegging. Senior managers seem to have very limited information about what is going on in their R&D labs. They also believed that all their R&D achievements are the result of their decision, the guidance and direction they give their R&D departments. In general, R&D managers were not comfortable discussing bootlegging that implies since there are not in control of their units. Besides, They did not allow the researcher to go through their documentations to check other source of data. Only in one case, was the researcher given access to the feasibility study and proposal prepared at the end of a bootleg project. Even those documents were not helpful as they did not include any information about bootleg process and they only reflected aspects of the bootleg project that the bootleggers had chosen to disclose to management.

All these limitations highlighted the necessity of revising the research design for this research project. Thus the next step was to find an appropriate research methodology to pursue this research. In addition, the PhD review panel after the first PhD review recommended the researcher to consider other research methodologies for this research.

II. Interview Questions

This section presents semi-structured interview designed for the purpose of this research. Section II.1 presents issues discussed by interviewees as the introduction to this project.

After the introduction, the first phase of interviews began with general questions about the interviewee and their organisation which are presented in Section II.2. Although these questions did not take more than five minutes, they were important because they gave the chance for the interviewer and interviewees to spend some time having a conversation before starting on the sensitive questions. At this stage, once it was felt that the interviewee's trust had been gained, the interviewer began to ask sensitive questions.

Then they were asked to choose a bootleg project which had been completed (preferably the last bootleg project) in order to discuss it in detail. Once they chose a project, the interviewer began to ask questions presented in Section II.3. Then the outcomes of the chosen project were discussed.

Section II.4 includes questions about personal benefits of bootleg projects for the interviewees. After letting the interviewee discuss any things that s/he wanted to mention that were not covered by the questions, the audio record were stopped. However the interview was not completed. Then the short questionnaire that was developed in the form of a table – presented in Table A.2 – was filled in by the interviewer with the help of the interviewee. This questionnaire includes questions about the outcomes of bootleg projects that the interviewee had previously mentioned s/he had pursued during the last two years. At this stage of interview, the audio recorder

was off. A wide range of issues often discussed at this stage including discussion of the relationship of the interviewee with his/her manager or criticism of organisation management, strategy, how important bootleg projects are for interviewees and their organisations, etc. Since this part of discussion was not audio-recorded, the interviewer tried to take notes of issues raised by the interviewee during the conversation.

II.1. Brief Introduction

- Thanking the interviewee for his/her participation.

- Reminding the interviewee that this is a confidential interview.

- Reminding the interviewee that the anonymity of participants will be maintained throughout the research process.

- Getting permission to record the interview.

- Reminding the interviewee that the researcher was the only person who would access and use this record for thesis and academic publication (no one else would gain access to the interview material).

- Informing the interviewee that the record will be transcribed, coded and translated into statistical data.

- Informing the interviewee that he/she can stop the interview at any time or refuse to answer any question.

- Informing the interviewee that if they wanted to discuss anything that they prefered not to have recorded, that would also be an option.

- As a thank you for their participation, they would receive a document including the research findings and their implications for both organisations and individuals once the research were completed.

- The topic was introduced as: A study of unofficial projects developed by employees and middle managers to benefit their organisations.

- An overview was given to the interviewee: the interview starts with some general questions about the organisation and the interviewee, followed by detailed discussion of one project.

II.2. General Questions

1. What industry are you working in?

2. How is your organisation structured?

    i.   How many people work in your company?

    ii. How many people work in your division?

    iii. How many people work on R&D and product development activities?

3. Could you explain the organisation hierarchy from top to bottom?

    i.   Who is your direct supervisor or manager?

    ii. Who is the person who approves or rejects research projects when employees have an idea (who is the gatekeeper)?

    iii. What is this person's background?

    iv. Is he/she easily able to understand your ideas and work?

    v.   Is your direct supervisor/manager the gatekeeper?

4. What is your position and what are your responsibilities in the company?

    i.   What is your official job description?

    ii. What are your informal responsibilities?

    iii. What is the nature of your work?

5. How is your relationship with the management?

    i.   How is your relationship with your supervisor/manager?

ii. How is your relationship with the gatekeeper?

iii. What is their background? Are they able to understand your ideas and work?

6. How do you manage your time when you are in the company?

   i. Is your time tightly structured?

   ii. How many projects do you normally work on at one time?

   iii. How do you divide your time between your different responsibilities?

7. How does the process of decision-making about R&D projects work in your organisation?

   i. Are these decisions made by a group of people?

   ii. Who makes the final decision?

   iii. Do you participate in the process of decision-making about R&D projects?

8. Do you have any official system that employees can submit their ideas through?

   i. Does it work as it is supposed to?

   ii. How often do you submit your ideas through this system?

   iii. What do you do before submitting your ideas?

9. How is the R&D budget allocated to projects?

   i. Is the budget allocated periodically (for instance annually) or is it more project based?

   ii. Is there any special budget for unforeseen projects such as those which emerge between two planning periods?

      a. If yes, do you have access to this particular budget if you need it when you come up with a new idea?

10. Are you given time and freedom to pursue your interests and ideas?

   i. Are you officially allowed to spend a percentage of your time working on your ideas?

    ii. Are you given freedom and time to pursue your ideas because of the nature of your work?

    iii. Are you given more freedom to pursue your interests than your peers, as a result of your previous accomplishments?

11. What do you do when you come up with a new idea?

    i. Do you try to get permission to pursue the idea as the first step? Why?

    ii. What do you need to do to get permission?

    iii. How does it fit with the gatekeeping process?

12. Have you ever proposed something to the management and had it rejected?

    i. What did you do next?

    ii. Did you pursue it? Why?

13. Apart from formal projects assigned to you, how many ideas have you pursued informally during the last two years?

    i. How many of them were pursued independently, without managerial knowledge or were at least initiated in this way?

    ii. How many of them were pursued without explicit permission but your management was fairly aware of them from the starting point?

    iii. How many of them were pursued despite management rejection or despite falling into an area that is prohibited by the management?

II.3. Questions about the last project

"Specifically consider the last unofficial and independent project that you completed, whether or not it was successful, whether or not it resulted in any innovation, and then answer the following questions"

14. Could you please give me a brief explanation of the project?

15. What prompted you to come up with this idea?

    i.   Totally new idea, not related to the company business?

    ii. New idea related to the company business?

    iii. Part of an official project?

    iv. Following up on someone else's ideas or work?

16. What did you do when you came up with the idea?

    i.   Did you try to get permission to work on it once you came up with the idea?

17. Why did you choose to pursue the project independently?

18. What motivated you to pursue it?

19. What risk did you think you were taking by pursuing this project?

    Why did you go beyond your duties and take the risk?

20. How did you manage your time to be able to work on your project?

    i.   Using permitted time to work on your project?

    ii. Company time assigned to official projects?

    iii. Your own time/working at home?

    iv. Any other type of working time?

21. What sort of resources did you need to pursue the idea before presenting it to the decision makers?

    i.   Did you need financial resources? Did you need to buy anything or pay for anything?

    ii. How did you gather the required resources for your research?

    iii. How did you finance your independent project?

    iv. Did you use resources assigned to official projects?

22. What was the cost of this project for the organisation (in terms of time and resources allocated to official projects)?

23. Who else participated in this project?

    i.   How did you decide whom to approach?

    ii. What is their background?

    iii. What department they are from?

    iv. From outside or inside the organisation?

    v. How did other participants help you?

24. When did you discuss the project with your direct supervisor/manager?

    i.   How far was the project developed?

    ii. Why did you discuss it with your supervisor?

    iii. What was his/her reaction to it?

25. Have you presented your idea to the decision-makers/gatekeeper in the company?

[If No]

    i.   Why not?

    ii. What stopped you presenting it to the gatekeeper?

    [If it failed: Go to Q31]

    [If it is not finished yet]

        a. How do you see your progress?

        b. Has the project changed significantly from the initial idea?

        c. When do you think you will present it to the decision-makers?

        d. What are you waiting for? At what stage are you going to present it?

        e. What do you expect to achieve ultimately?

    [Go to Q31]

[If Yes]

26. When did you decide to present the project to the gatekeeper?

    i.   Why did you decide to present it to the gatekeeper?

    ii. How far had the project been developed by then?

    iii. What were the roles of the other participants in this decision?

27. What was the decision-maker's reaction to the project?

    Has the project been officially accepted?

    [If Yes: go to 28]

    [If No]

    i. Why?

    ii. What happened when you presented it?

    iii. Was it rejected by the management?

    iv. What did you do next?

    [Go to Q30]

28. What happened to the project after it was accepted?

29. What difficulties did you and your project confront after it became an official project?

30. Did the project directly result in innovation?

    [If Yes]

    i. Could you explain to me what is innovative about it?

    ii. Is it an application of new technology or an improvement upon existing technology?

        a. Is there proprietary technology involved?

    iii. Is there significant patent protection involved in this project or is it limited?

    iv. Do you see it as product innovation or process innovation?

    [Product innovation]

        a. Did it result in a new product?

          • New product in the market?

- New product for the company?

- Highly specialised and customised?

- Can it be easily copied by competitors?

b. Did it result in an improvement upon existing products?

- Significant improvement upon existing products?

- Slight change in the product?

- Few characteristics of the product changed?

c. How is it different from previous product or products?

- Does the core concept change?

- Does the design of the product change?

- Does the relationship between the core concept and component change?

- Does the core component change?

d. Does it target existing customers or new customers?

e. Does your competitor have any substitute for this or is it new to the market?

f. How different is this product from the company's existing products and other existing products in the market in terms of features, specialisation and customisation?

g. How did the product perform in the market?

[Process innovation]

a. Did it result in a new process or was it more of an improvement upon an existing process for the company?

b. How much change was brought to the company by implementing this innovation?

    c. How different is this process from similar processes in the company and the industry in terms of features, specialisation and customisation?

- Does the core concept of process change?

- Does the design of process change?

- Does the relationship between the core concept and certain parts of process change?

    d. How did it perform after being implemented in the company?

    e. Did it result in significant time and resource savings?

    f. Did it result in significant cost savings?

    g. Did it improve production or other function performance?

[If No]

31. What was the outcome of project for the company?

32. How did the company benefit from this project?

33. How did you personally benefit from this project (in terms of experience or reward)?

    i. Did you expect to receive benefits?

II.4. Back to General Questions

34. Do you prefer working officially or independently?

    i. Why?

    ii. What are the advantages of unofficial work?

    iii. What are the difficulties involved in the unofficial process?

35. You mentioned you were engaged in ... projects in the past two years. How many of them directly resulted in innovation?

[For those resulting in innovation]

    i. Could you please fill out this form[1] for those projects that resulted in innovation?

[For those didn't result in innovation]

    i.   Why didn't they result in innovation?

    ii. What were the benefits of the projects that didn't result in any innovation?

    iii. If they failed, why did they fail?

    iv. What was the cost of projects that didn't result in innovation?

36. Is there anything else you want to say?

"I would be grateful if you would introduce me to other people who carry out unofficial projects inside or outside your company."

---

[1] This form is presented in Table A.2.

Table A.2: Form given to interviewees to fill up for each of their bootleg projects pursued in last two years

Project Name or code:	
Technology: ☐ Application of existing technology ☐ Application of new technology ☐ Application of proprietary technology	
Patent Protection:	
☐ Limited	☐ Significant

☐ Product Innovation:
  ☐ New product to the market
  ☐ New product for the company
  ☐ Competitors don't have any substitute for it
 	
☐ Can't be copied easily by competitors
☐ Significant improvement upon existing product
☐ Slight improvement upon existing product
☐ Core concept changed
☐ One or few components changed but not the core concept
☐ Relationship between core concept and component changed
☐ Design of product changed
	☐ Process Innovation:
	  ☐ New process in the industry
	  ☐ New process for the company
	☐ Significant improvement upon existing process
	☐ Slight improvement upon existing process
	☐ Core concept changed
	☐ One or few components changed but not the core concept
	☐ Relationship between core concept and component changed
	☐ Design of process changed

Performance in the market:
  ☐ Not clear
  ☐ Unsuccessful
  ☐ Successful
	Performance in the company:
	  ☐ Not clear
	  ☐ Unsuccessful
	  ☐ Successful

Targeted customer
  ☐ Existing customers
  ☐ New customers	

III. Coding Sample

Figure A.1: Coding Sample

1027 Interview

…

Interviewer:

Who is your direct manager? How is your relationship with him?

1027:

He is our lab manager who works directly under Executive Vice President of Development. Surprisingly he is a …[Specialty of the direct manager] *surgeon, nothing to do with development. He is extremely narrow experienced and extremely political …with no knowledge. As I told you, I don't have much respect for him… In my view, he doesn't add anything at all to my job, my career or my ability to do the job*

Interviewer:

Is he able to understand your work and ideas?

1027:

No not at all, even after multiple round of conversation. In fact he would very much rely on opinions of others to access the validity of my ideas as suppose to judge them himself. The opinions of others are often clouded by political motivate rather than scientific or product development reasons.

…

Interviewer:

When did you discuss the project with your direct manager?

1027:

No, I didn't discuss it with my direct manager before discussing it with the decision makers. Because you know *that would be an exercise in futility. It was just a waste of time. I would have spent an hour explaining what it was about and then he could not make decision on this and then he would have told me to talk to somebody else. What it would have done was it would have started a political interrogation.*

It took us *nine months* to do …[indicating specific test that is removed to maintain confidentiality of discussion] *test and get the data, what we did was we met between the 4 of us to discuss* it. Then I took it *to the senior management,* the Executive Vice President of Development … and *simultaneously the project responsible person took it to the project team saying this what we thing is a good idea.*

Codes (right margin):
- 2.6.Hierarchy
- 2.6.1.Direct manager
- 3.16.3.Bad relationship with DM
- 3.16.5.Lack of trust
- 3.16.7.Different background, understanding problem
- 6.8.4.first step doesn't occur understanding
- 3.16.3.Bad relationship with DM
- 3.16.5.Lack of trust
- 6.6.1.1.1.Length of time
- 6.8.6.2.Feasibility
- 6.6.2.4.4.Colleagues
- 6.8.4.1. Approach a senior
- 6.8.2.Second step, presenting to decision

IV. Research Limitations and Ethical Implications

This section covers research limitations and ethical implications of the research project. As with any strategy, the interview method and snowball sampling throw up some methodological difficulties. However, these must not prevent researchers from addressing sensitive issues (Sudman *et al.*, 1988; Lee and Renzetti, 1990). It is crucial to be aware of these difficulties and take them into consideration when the research is being designed and implemented. Where possible, strategies must be devised to deal with the problems; those difficulties that cannot be overcome must be acknowledged as research limitations and taken into consideration when it comes to presenting the research findings. The research difficulties and ethical implications of the current study are outlined below, along with the actions that have been taken to address them:

- The various types of potential bias inherent in snowball sampling raise concerns about the external validity of the research (Faugier and Sargeant, 1997; Bernard, 2005). Even though this is a concern from the positivists' point of view, not from the realists', it is worth mentioning that this research has a proper strategy to address this problem. To deal with this the researcher undertook following actions:

  ✓ Selected a large number of initial contacts, as recommended by Biernacki and Waldorf (1981b) and Voss et al. (2002). As was mentioned, over 600 engineer and scientist were consulted to find several starting points from different industries and different firms.

  ✓ The eligibility of respondents has been checked prior to interviews (Faugier and Sargeant, 1997) to ensure that it is bootleggers who are being interviewed. As

mentioned before, prior to interviews, the interviewer had chatted with potential participants and tried to gather some information about them.

✓ The referral chain has been paced and monitored to check the direction of referrals and to balance the variability of the sample from positivists' point of view (Atkinson and Flint, 2001).

✓ Atkinson and Flint (2001) also advised that the number of participants in each chain be managed. However, this has not been a significant concern for this research as bootleggers have rarely introduced other bootleggers in their organization to the interviewer.

• Other concerns, from a positivist perspective, is the bias resulting from the interview process and then bias in the way that data analysis was undertaken. One of the aspects of a realist perspective is that the researcher must be aware of the fact that his research and findings might not necessarily be repeatable if the same research was undertaken by another researcher. This is because it might not possible to understand the reality as it really exists. Therefore, every researcher based on his/her background and the methodology utilised may have a different understanding of the underlying structure and mechanism of a phenomenon. This was extensively explained in section 3.2 of this chapter.

✓ In realist research, the researcher must be aware of this fact and try to discover the underlying structure and mechanism of phenomena.

✓ It is also necessary to remind the readers and those who use the finding of this researcher that this research is subject to a variety of biases the such as bias in data collection process, in the interview process, in the data analysis method, etc.

- ✓ Specifically for this research, the process of data analysis was undertaken twice; once for the purpose of the third PhD review and the second time after the review for the purpose of writing the PhD thesis. The order of processing interviews for data analysis was changed in order to check whether the same findings would be made.

- An ethical concern about snowballing is that participants may share information about the person they refer which the referred person may not wish to be shared (Lee, 1993).

  - ✓ Although that has not been the case in this research, the researcher has only recorded and used information as permitted by participants.

  - ✓ Information gathered about the interviewees prior to interviews has been discussed with the interviewees to make sure that there is no misrepresentation or that any issue that they don't want to be included in this research data is omitted.

- Bootleggers may be reluctant to reveal the true extent of their clandestine activities. The researcher has tried to address this by adopting the following measures:

  - ✓ Using face-to-face interviews makes it easier to gain the interviewees' trust.

  - ✓ The interviewees were reassured that the researcher had no interest in engaging in their work and had no links with their organisation.

  - ✓ Meeting bootleggers outside their organisations for the first time and then interviewing them again in a place outside their working environment would help too.

  - ✓ Being introduced to bootleggers by another member of the bootlegging network should facilitate the building of trust between interviewee and interviewer.

✓ The interviewees were encouraged to see themselves as informal assistants, in order to reduce any suspicion they may have had and to build up trust (Faugier and Sargeant, 1997).

✓ Sensitive questions have only been asked once trust had been built up between interviewer and interviewee.

• Bootleggers may be reluctant to discuss their failures – it may be difficult to capture information about failed bootleg projects. Fortunately, this limitation has been overcome to some extent by:

✓ Reassuring interviewees that the research will not impact on them in any way.

✓ Carrying out the interviews at weekends or after work in a comfortable place outside the organisation such as a coffee shop.

✓ Asking questions about unsuccessful experiences at the end of the interviews, when trust has been built up between interviewer and interviewee.

✓ Stopping the recorder at the end of the interview to discuss unsuccessful experiences and just listening and filling in the form designed for this purpose. This approach was adopted after the pilot study.

• The questions must be designed in such a way as to reduce the tension and sensitivity of this issue.

✓ The interviewer has avoided using terms that have negative meaning such as bootlegging, clandestine, hidden, etc. Instead he has used terms such as unofficial, informal, unknown to management, independent etc.

✓ The pilot study was a great opportunity to test the interviewee questions to find any flaws. After the pilot study, some of the questions were revised which significantly help to reduce the tension and concerns of interviewees.

- Interviewees may find it hard to explain their behaviour because they lack the vocabulary to describe it, or because they have carried out some of their activities unconsciously. Bearing this in mind, the interviewer has:

  ✓ Used open-ended questions.

  ✓ Allowed interviewees to tell their story.

  ✓ Engaged with interviewees and tried to help them to explain their experience.

  ✓ Asked for further explanation and clarification when required.

- Limiting the research methodology to interviews with bootleggers and ignoring other stakeholders and perspectives may give rise to questions about the internal validity of this research. This is also a concern which may be raised by positivists.

  ✓ It should be borne in mind that because of nature of bootleg projects – being clandestine – there is no other reliable source of information or appropriate person to be interviewed.

- Bootleggers may not be the best people to ask to evaluate the benefits of their projects or the performance of their innovation in the market.

  ✓ This must be accepted as a research limitation. Approaching other stakeholders – particularly managers – would make it harder for bootleggers to trust the researcher and reduce chances of gaining valuable information.

- There is an ethical concern about maintaining the anonymity of participants and protecting the confidentiality of sensitive information. So the researcher:

  ✓ Handled (classified, analysed and presented) the collected data in such a way as to ensure that anonymity and confidentiality will be maintained.

  ✓ Has not named any individual or organisation in any documents.

  ✓ Assigned a code to every individual and organisation and used these codes to reference them.

✓ Has not included any sort of data that could be used to identify interviewees.

✓ Technical aspects of projects are not presented – although they have been used while data were analysed – to maintain the confidentiality of interviews.

✓ Whenever direct quotes of interviewees' comments are needed in presenting data, their permission has been acquired beforehand.

- Where interviewees have raised other concerns, the researcher has done his best to address them. For instance, a few interviewees have asked the interviewer to:

✓ Destroy the audio files of their interview after it has been transcribed.

✓ Avoid quoting the technical issues discussed during interviews.

✓ Avoid specifying their type of business as they work on specific market niches and they could easily be identified.

V.Pursuing Rejected Ideas and Projects

The interviewer discussed the issue of pursuing rejected projects by interviewees. This section presents interviewees' responds to these questions.

One of the reasons for bootlegging raised by previous papers is rejection by management. Therefore, in order to understand reasons for bootlegging, it is important understand interviewees' reactions to the rejections. This could explain some characteristics of interviewees such as their respect for management decisions, their wiliness to undertake risks, and also whether they are able to act against management will. Thus they were specifically asked if they had experienced getting managerial rejection and what was the next step for them. Their responses are shown in Table A.3.

As is shown in the table, those who would not pursue rejected ideas and projects have at least one of the following characteristics: they are either from product development units or normal staff. On the other hand, those who face less strict rejection are from research units and mostly from the telecommunication industry. Finally it can be concluded from this table that the chance of pursuing such projects by middle manager and senior staff who work in research lab, technology development and R&D units is higher than the chance of such project being pursued by a less experienced employee such as normal staff who work in product development units.

V.1. Never faced absolute rejection

First of all, six interviewees mentioned that in their organisation or at least in their unit, ideas normally would not get absolute rejections. What happens for the cases of these interviewees is as shown in Table A.3, they will receive feedback on the ideas and some reason for why they are not officially approved, but they would not be prohibited from

improving the idea or developing it unofficially. The following comments elucidate

their circumstances:

Code	Positions	Primary Responsibility	Industry	Reaction to rejected projects
1001	Staff	R&D	Health.	Would not be pursued
1002	Senior Staff	R&D	E. S. C.	Might be pursued
1003	Middle Manager	Product Development	IT	Might be pursued
1004	Staff	Product Development	E. S. C.	Would not be pursued
1005	Staff	Research	Health	Might be pursued
1006	Middle Manager	Product Development	E. S. C.	Might be pursued
1007	Middle Manager	Product Development	E. S. C.	Would not be pursued
1008	Senior Staff	Technology Development	Health	Might be pursued
1009	Middle Manager	R&D	E. S. C.	Might be pursued
1010	Middle Manager	Product Development	Health	Might be pursued
1011	Senior Staff	Product Development	E. S. C.	Would not be pursued
1012	Staff	Product Development	E. S. C.	Might be pursued
1013	Senior Staff	Product Development	Health	Would not be pursued
1014	Senior Staff	Product Development	Health	Save them for retirement
1015	Middle Manager	Product Development	E. S. C.	Might be pursued
1016	Staff	R&D	IT	Might be pursued
1017	Staff	Product Development	IT	Might be pursued
1018	Staff	Research	Telecom	Might be pursued
1019	Staff	Research	IT	Might be pursued
1020	Staff	Research	E. S. C.	Might be pursued
1021	Middle Manager	Product Development	Health	Would not be pursued
1022	Staff	Product Development	E. S. C.	Might be pursued
1023	Staff	Product Development	Telecom	Might be pursued
1024	Senior Staff	Product Development	Health	Might be pursued
1025	Staff	Product Development	E. S. C.	Would not be pursued
1026	Senior Staff	Research	Telecom	Might be pursued
1027	Middle Manager	Product Development	Health	Might be pursued
1028	Senior Staff	Research	IT	Might be pursued
1029	Staff	Product Development	IT	Might be pursued
1030	Staff	Technology Development	Telecom	Might be pursued
1031	Senior Staff	Research	IT	Might be pursued
1032	Staff	Product Development	Health	Would not be pursued
1033	Middle Manager	Product Development	Health	Might be pursued
1034	Senior Staff	Product Development	IT	Might be pursued
1035	Staff	R&D	Health	Might be pursued
1036	Middle Manager	R&D	E. S. C.	Might be pursued
1037	Staff	R&D	IT	Would not be pursued
1038	Staff	R&D	IT	Would not be pursued
1039	Senior Staff	Product Development	IT	Might be pursued
1040	Middle Manager	Research	Telecom	No strict rejection
1041	Staff	Product Development	E. S. C.	Would not be pursued
1042	Staff	Research	Telecom	Might be pursued
1043	Staff	R&D	IT	Would not be pursued
1044	Middle Manager	Research	Telecom	No strict rejection
1045	Staff	Research	Telecom	No strict rejection
1046	Staff	Technology Development	Telecom	Might be pursued
1047	Senior Staff	Research	IT	No strict rejection
1048	Staff	Product Development	E. S. C.	Would not be pursued
1049	Senior Staff	Research	Telecom	Might be pursued
1050	Senior Staff	Research	Telecom	No strict rejection
1051	Staff	R&D	IT	Might be pursued
1052	Staff	Product Development	IT	Would not be pursued
1053	Senior Staff	Research	IT	Might be pursued
1054	Middle Manager	R&D	Telecom	Might be pursued
1055	Staff	Research	E. S. C.	No strict rejection

Table A.3: Possibility of pursuing rejected projects

Keys: Telecom: Telecommunication, **E. S. C.**: Electrical and electronic sensors and control systems, **Health**: Healthcare, **IT**: Information Technology

"*I would say I never heard of a project being prohibited by the management.*

Even a lot of stuff that was far out of the business charter can actually be

pursued. There were a couple of projects that were completely outside of anything that we had ever commercialized – not that I am working on – but others are. Often the feedback from the management is that they don't think that's not going to work. So, most of them don't continue, but I don't know how many of them management say that is not going to work or how many eventually just lose interest in it or think that it is not going to work."   (1055, Staff, Research)

"*As a general comment, there is not some sort of formal process that those things happen… I don't feel those are rejected. If I feel an idea is important to pursue then I'll pursue it. As a general comment, people do not say you can't work on that…* [It doesn't mean that] *things that are not worked on are not valuable; only because of resource constraints, not because one person's opinion is different from another.*"   (1047, Senior Staff, Research)

V.2. Would not pursue rejected ideas

Apart from the four interviewees mentioned above, the rest of interviewees had experienced receiving rejection. 14 of whom said they would not pursue rejected projects for several reasons, such as: being busy with official projects, there are plenty of new ideas emerging, getting permission for rejected projects is not easy, they don't want to waste their time working on projects that may not be approved, respecting management decisions, etc. The following responses are common among these interviewees:

"*I just drop it... They kind of have a more global picture, I am looking at it more from this would be nice product but they also look at it from the overall economic perspective for the company and what the pay off for engineering*

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would be. I am plenty busy and I don't have time for this and I just go with whatever is in my plate." (1011, Senior Staff, Product Development)

"*I just give up, because the chance of being accepted for these ideas is very little.*" (1032, Staff, Product Development)

"*Yes, because if the management reject a project usually it is because the market is not big enough for the product or it is not worth it. Well, I do consider these things when I propose an idea but I am not really the expert… I respect …[their] decisions. At the end of the day I am doing it for the company good and most of the time I don't personally benefit from doing this...*" (1038, Staff, R&D)

V.3. Might pursue rejected ideas

Fascinatingly, a majority of interviewees – 34 out of 55 – admitted that they might pursue rejected projects. However, there are several issues that might influence their decision to pursue a rejected idea or project. First of all the type of rejection is important and the type of feedback they get from the management and/or decision makers is important. For instance, several of them highlight that if they got absolute rejection they would not pursue the project whereas if they got some feedback highlighting the weakness of their idea or their project, they would go ahead and improve their idea. The following comment is a common observation:

"*Quite often yes. Sometimes the feedback is the idea is kind of raw. It needs a little bit more informal development. Go away for a while and come back with kind of more sort of unfunded informal development… It is kind of unusual to get sort of I would say outright rejection.*" (1028, Senior Staff, Research)

In addition, often the ideas get rejected because of the resource or time limitation in that specific planning period. So the same idea may get approved for the next planning period – next quarter or fiscal year. In these circumstances, the interviewee would not drop the idea; instead s/he would put it on hold or pursue it in their spare time. For example two interviewees mentioned:

"*... when we submit an idea and it's turned down, we would get an answer why the idea is rejected. Maybe the budget is tight and we can't get any more projects this fiscal year. If this is the case then I would keep the idea and I'll follow it up next year. But sometimes they think that there is enough application for that or the impact won't be strong enough, or the financial benefit of the project wouldn't justify the investment.*" (1016, Staff, R&D)

"*Absolutely. It depends on the type of rejection. Very frequently the rejection is not absolute. The rejection is more, for example, this quarter we have already allocated our budget and we are very budget constrained. We can't do anything this quarter but come back with the same idea next quarter… If the rejection is absolute, then in general I would drop the idea.*" (1036, Middle Manager, R&D)

Even if the rejection is more of a criticism, there are circumstances under which interviewees would undertake a reject idea or project. In such cases they seem to be enthusiastic and very interested in the idea; they also strongly believed that the idea would work and benefit the organisation, so they will be able to get official approval for their idea after a while. As some interviewees commented:

"*It highly depends on how strongly I think it is going to have some added-value to the company.*" (1010, Middle Manager, Product Development)

"*Sometime modify the idea just a little bit or just drop it. I guess it depends on the level of interest vs. that would never work for us or it isn't worth the time.*"

(1015, Middle Manager, Product Development)

As is clear from the above comments and the rest of the comments presented in this section, rejection by the decision makers and the management does not turn them against the management. None of the interviewees made a comment that could be interpreted as rejection of management, disagreement with management, competing with the official system of management, proving to management they are wrong, or reluctance to obey superiors as reasons they pursue a project clandestinely. Instead, interviewees' comments show that if they strongly believe in the idea that would benefit the organisation and they have a chance of getting official approval if they make some progress, they would pursue their rejected ideas. The following comments are common observations:

"*I'll keep it in the background for a while and see what level of confidence I have as times goes on. Typically it will often mean that I spend less time on it and a lot of ideas, they do show weaknesses after a while. Most things I would say they end up dying after I spend 20 hours 40 hours on them.*" (1023, Staff, Product Development)

"*Sometimes you need to be persistent to convince them… Depends on the arguments made against it. If it is clear-cut case of say we don't have any business interest in this, then obviously we don't have chance. But if the case says the impact is very weak, then we go back and work more on it to make a convincing case and come back later. If it is not in our business model, it doesn't make any sense to us*" (1054, Middle Manager, R&D)

At the end of interviews when the audio recorder was stopped, those who mentioned they might pursue rejected projects were questioned about whether they did it to prove their manager wrong, to show resistance against management or the official system, or to fulfill a psychological need to go against management decisions. All of them denied such a mid set and emphasised the benefits of their ideas for organisation.

V.4. One exception

There is also an interviewee who was close to retirement. Since recently there were some change happening in his/her organisation which influence how they work and these changes have made some problems with getting permission to pursue bottom-up projects. Since s/he recently received several rejections and won't be around for a long time, s/he is keeping rejected projects to pursue when retired.

> *"Oh, yes. Save it for retirement. I would pursue it literally in my own time as a side…"* (1014, Senior Staff, Product Developemnt)

V.5. Summary of pursuing rejected ideas and projects

First, there are six interviewees who do not face absolute rejections in their organisations. They normally get feedback and they can go back and work on the idea and come back later. These interviewees work in research units of mainly telecommunication and IT companies.

Apart from them, 14 interviewees denied pursuing rejected projects as they are too busy, there are plenty of new ideas to pursue, getting official approval for such project is not straightforward for them, they respect management decisions, etc. These interviewees are either from product development units or normal staff or both.

On the other hand, a majority of interviewees – 34 out of 55 – admitted that they might pursue such a project depending on the type of rejection they get and how strongly they believe on the idea. It must be borne in mind that there is no sign that an interviewee would start to bootleg just because of being rejected or over a disagreement with management. Even in the cases where they said they would pursue rejected projects or ideas, they would not do it to prove the management wrong or to compete with the official system in their organisation. Instead, it seems that they prefer to know why their ideas are rejected to be able to improve them if they are worth doing.

VI. Bootleg Projects Pursued in Last Two Years

The interviewees were asked how many bootleg projects they had been involved in within the last two years; this section focuses on these projects. Interestingly, all of the 55 interviewees had been involved in more than one bootleg project in the last two years. Table A.4 shows that bootleggers had been involved in between two and 12 bootleg projects in the last two years, with the average being four projects. This average value is relatively higher for senior staff in product development and R&D departments – the average value for senior staff in R&D departments is 5 and for the senior staff who work in product development is 6. Having a higher average number of bootleg projects pursued by senior staff in product and R&D developments is partly because of two interviewees (1014 and 1034) with higher numbers of bootleg projects in last two years.

Four interviewees explicitly said that they are always looking for new ideas and they take every opportunity to pursue their own projects. These are bootleg projects that required a significant amount of time and/or resources; 18 interviewees declared that this number was much bigger if they counted small ideas lasting a few days and using no, or very few, resources.

> "*I am gonna define it as having an idea and testing it in the lab and seeing if it works. This is like a three days thing, maybe 50. I do a few every week... 10 of them were extended to more of projects that I spent significant time on ...*"
> (1014, Senior Staff, Product Development)

Table A.4: Bootleg projects pursued in last two years							
Code	Position	Primary responsibility	Industry	Total number	True bootlegging*	Quasi bootlegging	Hardcore bootlegging**
1001	Staff	R&D	Health.	8	8		
1002	Senior Staff	R&D	E. S. C.	5	5		
1003	Middle Manager	Product Development	IT	6	6		2
1004	Staff	Product Development	E. S. C.	7	7		
1005	Staff	Research	Health	3	1	2	1
1006	Middle Manager	Product Development	E. S. C.	3	3		1
1007	Middle Manager	Product Development	E. S. C.	2	2		
1008	Senior Staff	Technology Development	Health	4	0	4	1
1009	Middle Manager	R&D	E. S. C.	4	4		1
1010	Middle Manager	Product Development	Health	2	0	2	
1011	Senior Staff	Product Development	E. S. C.	5	0	5	
1012	Staff	Product Development	E. S. C.	3	3		
1013	Senior Staff	Product Development	Health	3	3		
1014	Senior Staff	Product Development	Health	10	10		1
1015	Middle Manager	Product Development	E. S. C.	3	2	1	
1016	Staff	R&D	IT	4	4		
1017	Staff	Product Development	IT	4	3	1	
1018	Staff	Research	Telecom	4	2	2	
1019	Staff	Research	IT	2	2		
1020	Staff	Research	E. S. C.	6	6		
1021	Middle Manager	Product Development	Health	7	2	5	
1022	Staff	Product Development	E. S. C.	6	4	2	
1023	Staff	Product Development	Telecom	3	3		
1024	Senior Staff	Product Development	Health	5	5		2
1025	Staff	Product Development	E. S. C.	4	4		
1026	Senior Staff	Research	Telecom	6	6		1
1027	Middle Manager	Product Development	Health	2	2		1
1028	Senior Staff	Research	IT	5	3	2	
1029	Staff	Product Development	IT	3	2	1	
1030	Staff	Technology Development	Telecom	2	2		
1031	Senior Staff	Research	IT	4	4		1
1032	Staff	Product Development	Health	2	2		
1033	Middle Manager	Product Development	Health	6	6		2
1034	Senior Staff	Product Development	IT	12	12		2
1035	Staff	R&D	Health	6	6		3
1036	Middle Manager	R&D	E. S. C.	2	2		1
1037	Staff	R&D	IT	3	3		
1038	Staff	R&D	IT	8	8		
1039	Senior Staff	Product Development	IT	3	3		1
1040	Middle Manager	Research	Telecom	4	4		
1041	Staff	Product Development	E. S. C.	3	3		
1042	Staff	Research	Telecom	2	2		2
1043	Staff	R&D	IT	2	2		
1044	Middle Manager	Research	Telecom	3	3		
1045	Staff	Research	Telecom	3	3		
1046	Staff	Technology Development	Telecom	5	5		2
1047	Senior Staff	Research	IT	2	2		
1048	Staff	Product Development	E. S. C.	3	3		
1049	Senior Staff	Research	Telecom	3	3		1
1050	Senior Staff	Research	Telecom	4	4		
1051	Staff	R&D	IT	3	3		
1052	Staff	Product Development	IT	4	4		
1053	Senior Staff	Research	IT	2	2		1
1054	Middle Manager	R&D	Telecom	3	3		2
1055	Staff	Research	E. S. C.	3	3		

Key: Telecom: Telecommunication, **E. S. C.**: Electrical and electronic sensors and control systems, **Health**: Healthcare, **IT**: Information Technology

* As mentioned before, bootleg projects are divided into two main categories of true bootlegging and quasi-bootlegging, based on level of direct manager awareness although both are hidden from decision makers.

** Both true bootleg projects and quasi-bootleg projects can simultaneously be hardcore bootleg projects. Every bootleg that is initiated to pursue either a project that has been previously rejected or falls into categories of areas forbidden by the management is considered as hardcore bootlegging.

Of the 55 interviewees, 44 mentioned that all the bootleg projects they had pursued within the last two years were initially hidden from management and not even their

direct manager knew of the project's existence. It means that 44 interviewees had pursued purely true bootlegging and not quasi-bootlegging projects. 11 interviewees said that they had been involved quasi-bootlegging. Looking at the type of relationship between interviewees who undertake quasi-bootlegging and their direct manager shows that the element of mutual trust and/or common background exists. This type of relationship helps them to communicate at early stage of some bootleg projects initiated by the interviewees.

Three of the 55 interviewees (1008, 1010, 1011) claimed that they had never been involved in any true bootlegging and that they had only engaged in quasi-bootlegging. They declared that this is because they have a great relationship with their direct manager and the direct manager is expert in the type of project they work on. Thus having mutual background and knowledge not only helps them to communicate effectively but also renders the direct manager's insight valuable. So they discuss their idea with their direct manager to get his/her opinion before doing any physical work on the project. For instance, the type of relationship of the interviewee 1008 with his direct manager, as he stated, is "*close friendship*".

20 interviewees admitted that they have pursued hardcore bootleg projects within the last two years which means they have pursued projects that were rejected or fall into the categories that are prohibited by the management. Interestingly, although the number of interviewees from IT, telecommunication and industrial and electrical device is greater than the number of interviewees from healthcare industry, a larger proportion of interviewees who come from healthcare industry undertake hardcore bootlegging – 7 from healthcare, 5 from IT, 5 from telecommunication, 3 from industrial and electrical devices and no one from the software industry. Among different interviewees with different positions, hardcore bootlegging is more common among those who are senior

staff and middle manager – 9 senior staff and 7 middle managers. Those interviewees whose position is normal staff and who pursue bootleg projects have relatively more experience than those who do not, in terms of years of experience. In the thesis, it is suggested that these people undertake more risky projects.

In total, 226 projects were pursued by the interviewees in last two years. As is shown in the Table A.4, 199 of them were identified as true bootleg projects and 27 projects were identified as quasi-bootleg projects. Among these 226 projects, 29 of them were also classified as hardcore bootleg projects meaning that they are pursued despite explicit managerial rejection and prohibition.

VI.1. Summary of bootleg projects pursued in last two years

In total the 226 bootleg projects pursued by the interviewees in last two years included 199 true bootleg projects and 27 quasi bootleg projects. The majority of interviewees – 44 out of 55 – admitted that all the projects they pursued in last two years were true bootlegging. Eight interviewees had pursued both true bootlegging and quasi bootlegging and three interviewees claimed that all bootleg projects they pursued are quasi-bootlegging which means they have discussed them with their direct manager at early stages, not to get permission but to get their feedback and perspective. Let's bear in mind that all these projects were hidden from decision makers who were able to approve or reject these projects. In addition, 29 out of 226 bootleg projects pursued by interviewees can also be considered as hardcore bootlegging meaning that they are pursued despite explicit managerial rejection or prohibition.

VII. Estimated Costs of The 55 Discussed Bootleg Projects

Interviewees were also asked to evaluate the value of resources used for their bootleg projects discussed in detail; this section presents research findings on this issue.

Figure A.2 shows estimation of resources used by bootleggers. In order to maintain confidentially of the discussion, this research is not able to present the data that shows specific answer of each interviewee. Therefore figure A.2 is used to present an overview of cost of bootleg projects.

Figure A.2: Estimated cost of bootleg projects

Percentage of discussed bootleg projects
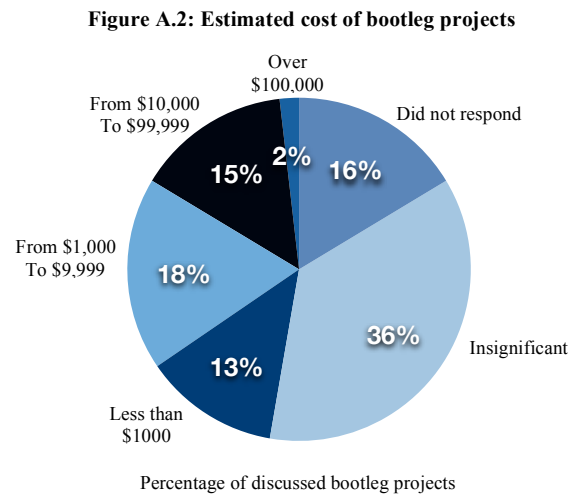
Two interviewees mentioned they were not comfortable answering this question while 7 others said they are not able to give an estimation of their cost as they are not aware of the value of some of the resources they used. Thus there are 9 interviewees who did not specify the costs of used resources for their bootleg projects. There are also 20 interviewees who claimed that the cost of their bootleg projects were not significant. 13 out of 20 where those who previously mentioned that they did not use significant resources whereas the 7 remaining used just a few slack resources and they thought the value of the slack resources used was not significant. Seven interviewees used less than

$1000 worth of resources[2], 10 used between $1000 and $10,000 worth of resources, eight used between $10,000 and $100,000 worth of resources, and one used more than $100,000 worth of resources.

The one interviewee who spent around $300,000 on his bootleg project over a long period of time is one of those middle manager who could sign off on a special budget. Another one of these managers also used $77,000 worth of resources while the other one of them just used $9000 worth of resources. 7 other interviewees who spent between $10,000 to $100,000 worth of resources also had a middle manager role or were senior staff who had a strong connection with their direct manager.

Consequently, the cost of bootleg projects pursued by normal staff and majority of senior staff is not significant, especially if they are compared to the total R&D expenditure of their organisation. Only a few middle manager or senior staff who have strong connections with their direct managers were able to spent large amount of funding on their bootleg projects or use relatively significant amount of resource. It must be borne in mind that it is not possible to evaluate the accuracy of these estimations here; these numbers are purely based on interviewees' statements. However, as was previously mentioned, the bootlegger is the only source that can be used to collect such information on bootleg projects.

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[2] The resources discussed in this section include raw materials, machinery, money spent to purchase software or machinery, etc. Time spent on projects is excluded from these resource calculations.

VIII. Outcomes of Bootleg Projects Pursued in Last Two Years

This section focuses on the outcomes of bootleg projects pursued in last two years. At the end of the interviews, participants were asked to fill up a questionnaire to determine the outcomes of other bootleg projects they had pursued in the last two years. In total, the 55 interviewees indicated they had engaged in 226 bootleg projects over the last two years. 37 interviewees, when they were choosing a project to discuss in detail, chose one of these projects pursued in last two years, while 18 interviewees chose to talk about earlier bootleg projects. Therefore, the results of 37 of the 226 projects have been discussed in the previous sub-section; this sub-section briefly reviews the results of the remaining 189 projects.

Figure A.3 shows the outcomes of these 189 projects. Among them so far only 81 – 43% of projects – have resulted in innovation. 22 projects – 12% – had other benefits for their organisation which are explained in this section. 42 projects have not been revealed yet as they are still incomplete and the interviewees are currently working on them thus they are yet to have benefit for their organisation. Finally, 44 projects – 23% of projects – had no benefits for the organisation because they are either failed or were rejected by the manager after being revealed.

Figure A.3: The outcomes of 189 projects pursued in last two year

Percentage of 189 bootleg projects pursued in last two years
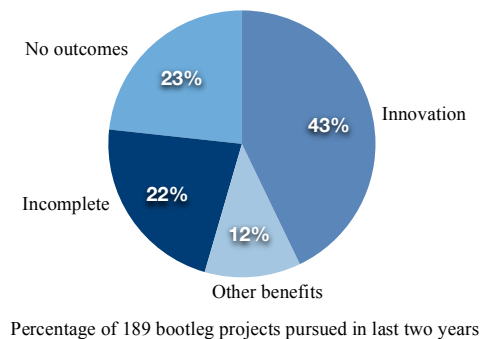
It must be borne in mind that one of concern with this research was that it might not be able to collect data about failure in bootleg projects. Data presented in here clearly indicates that this is not a valid concern and the applied research methodology was capable of collecting quality data on failure.

VIII.1. Innovation result from bootleg projects pursued in last two years

As is shown in Figure A.4, of 81 projects which resulted in innovation 76 of them – 93% – resulted in product innovation while only five of these projects – 7% – influenced a process in the organisation and are therefore better considered as process innovation.

Figure A.4: Produce vs. process innovation result from bootleg projects pursued in last two years
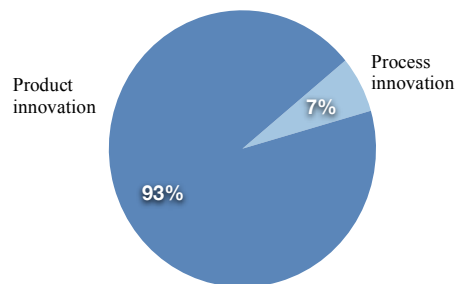
Percentage of 81 innovation resulted from bootleg projects pursued in last two years

Table A.5 shows characteristics of 81 innovation result from bootleg projects pursued in last two years by the interviewees. Interestingly, apart from four interviewees, the rest of the interviewees claim at least one of their bootleg projects resulted in innovation. Since these projects were not discussed in detail with interviewees, there is a chance that they exaggerate the outcomes of their bootleg projects. Therefore, the collected data about the outcomes of these projects may be subject to bias.

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**Table A.5: Characteristics of innovations result from bootleg projects pursued in last two years**

Code	Positions	Primary Responsibility	Industry	Number of bootleg projects result in innovation	Newness: New to Market or Industry	New to the company	Significant change in product or process	Slight change in product or process	Technology: Application of proprietary technology	Application of new technology	Application of existing technology	Patent protection: Significant	Limited
1001	S	R&D	Health.	3			1	2		2	1	2	1
1002	S S	R&D	E. S. C.	2		1		1	1	1		1	1
1003	M M	P. D.	IT	2		1		1	1	1		1	1
1004	S	P. D.	E. S. C.	2				2			2		2
1005	S	R	Health	1			1			1		1	
1006	M M	P. D.	E. S. C.	2			2			2		2	
1007	M M	P. D.	E. S. C.	0									
1008	S S	T. D.	Health	2			2		1	1		2	
1009	M M	R&D	E. S. C.	2			1	1		2		1	1
1010	M M	P. D.	Health	1				1			1		1
1011	S S	P. D.	E. S. C.	1			1			1		1	
1012	S	P. D.	E. S. C.	1				1			1		1
1013	S S	P. D.	Health	2				2		1	1	2	
1014	S S	P. D.	Health	2		1		1	1		1	2	
1015	M M	P. D.	E. S. C.	1		1				1		1	
1016	S	R&D	IT	1				1		1		1	
1017	S	P. D.	IT	2				2		1	1	1	1
1018	S	R	Telecom	2			1	1		1	1	2	
1019	S	R	IT	1			1			1		1	
1020	S	R	E. S. C.	2			1	1		2		2	
1021	M M	P. D.	Health	2			1	1			2	1	1
1022	S	P. D.	E. S. C.	2				2			2	2	
1023	S	P. D.	Telecom	2			1	1		1	1	2	
1024	S S	P. D.	Health	1				1		1		1	
1025	S	P. D.	E. S. C.	2				2			2		2
1026	S S	R	Telecom	2			2			1	1	1	1
1027	M M	P. D.	Health	0									
1028	S S	R	IT	2				2	1	1		1	1
1029	S	P. D.	IT	1				1			1		1
1030	S	T. D.	Telecom	1			1		1			1	
1031	S S	R	IT	0									
1032	S	P. D.	Health	1				1			1		1
1033	M M	P. D.	Health	2			1	1		2			2
1034	S S	P. D.	IT	4			3	1		3	1	2	2
1035	S	R&D	Health	2				2		2			2
1036	M M	R&D	E. S. C.	1			1		1			1	
1037	S	R&D	IT	2			1	1		1	1		2
1038	S	R&D	IT	2			1	1		2		2	
1039	S S	P. D.	IT	2			2			1	1		2
1040	M M	R	Telecom	1	1				1			1	
1041	S	P. D.	E. S. C.	1				1			1		1
1042	S	R	Telecom	1			1			1		1	
1043	S	R&D	IT	1				1		1		1	
1044	M M	R	Telecom	1			1			1		1	
1045	S	R	Telecom	1				1			1	1	
1046	S	T. D.	Telecom	2			2			2		2	
1047	S S	R	IT	1		1			1			1	
1048	S	P. D.	E. S. C.	1				1			1		1
1049	S S	R	Telecom	1		1			1			1	
1050	S	R	Telecom	1				1		1			1
1051	S	R&D	IT	2			1	1		1	1	2	
1052	S	P. D.	IT	2				2			2		2
1053	S S	R	IT	0									
1054	M M	R&D	Telecom	1			1				1		1
1055	S	R	E. S. C.	1			1			1			1

Key: S: Staff, **S S**: Senior Staff, **M M**: Middle Manager, **P. D.**: Product Development **T. D.**: Technology Development;
R: Research, **Telecom:** Telecommunication, **E. S. C.**: Electrical and electronic sensors and control systems,
Health: Healthcare, **IT**: Information Technology

Figure A.5 illustrates the newness of product and process innovations resulting from these 81 bootleg projects. 42 out of the 81 innovations yielded by bootlegging represent slight improvements upon existing products or processes, while 32 out of the 81 product innovations represent significant improvements upon existing products. Only seven innovations resulted in new products for the company; six of which products are no more than alternatives to products that already exist in the market – produced by competitors. In other words, only one of the projects resulted in the creation of a totally new product in the market, as is also shown in Figure A.5. This figure also demonstrates that all four of five process innovations are significant improvements upon existing processes and one of them is slight improvement upon existing process within companies. Thus 91% – 75 out of 81 – of innovations resulting from bootlegging represent slight or significant improvements over existing product or process.

Figure A.5: Newness of product and process innovations resulting from bootleg projects pursued in last two years
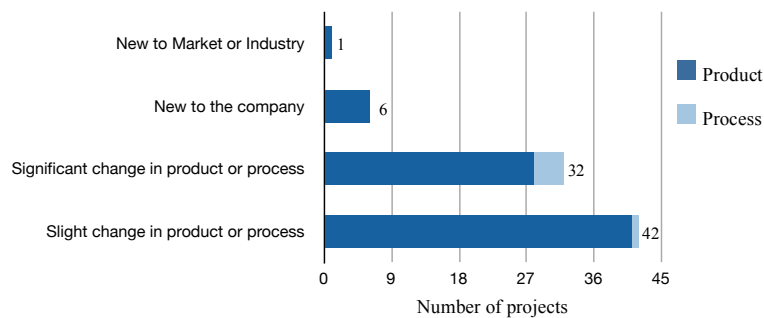

As shown in Table A.5: all six innovations that represent new products to the company are pursued by either senior staff or middle managers. Besides, the one project that resulted in the creation of a new product which was new to its market was also pursued by a middle manager. In agreement with findings presented in Chapter 7, the outcome of bootleg projects pursued in last years by interviewees also shows that staff tend to undertake projects that slightly change the characteristics of their existing products.

Figure A.6 also illustrates the technology applied in these 81 innovations. As shown in this figure, only 10 of them benefit from proprietary technology and just over half of these innovations (42 of them) are based on the application of new technology. The remaining 29 innovations were just based on new applications for existing technology and were mainly pursued by those who had staff positions, as is shown in Table A.6. Staff and/or those who focus on product development tend to apply existing technologies in their bootleg projects whereas those interviewees who work in technology development or research units benefit more from new or even proprietary technologies than the rest of interviewees.

Figure A.6: Technology applied in 81 innovations result from bootleg projects pursued in last two years
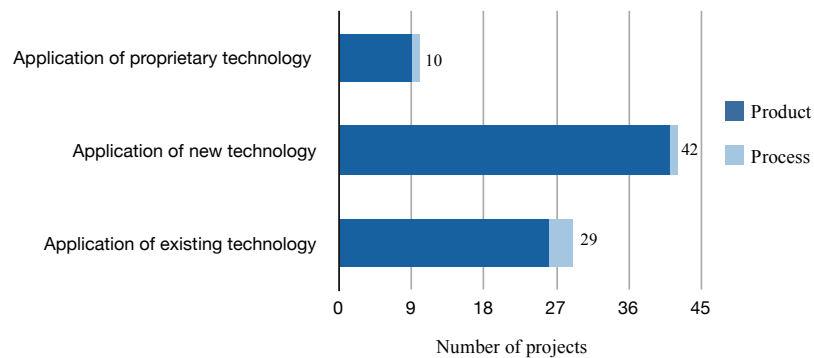
Finally, the significance of intellectual property embedded in these innovations is shown by Figure A.7 and Table A.5. Of 81 innovations, 33 embraced limited intellectual property – meaning that their outcomes have not been patented – while 48 of them are based on significant intellectual property gained from bootleg projects – at least one patent application has been filed.

Figure A.7: Intellectual property involved in 81 innovations
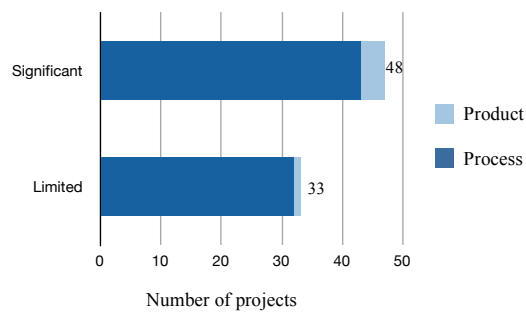
In order to identify the type of innovation result from bootlegging, as is done in Chapter 7, Henderson and Clark's (1990) framework for evaluating radicalness was applied. Based on changes in core concept and connection between concept and component, as proposed by Henderson and Clark (1990), these 81 innovations are classified in four different categories of radical, modular, architectural and incremental innovation.

This is also explained in Section 7.4 of Chapter 4, according to Henderson and Clark, when both core concept and connection between concept and component of product or process has changed, it is considered as radical innovation. When only core concept changes and connection between concept and component remains unchanged, the innovation called modular innovation. If only the connection between concept and component changes and the core concept remains untouched, it is called an architectural innovation. Finally, when both core concept and connection between concept and component remain unchanged, the innovation is classified as incremental innovation.

Based on the description presented above, these 81 innovations are classified in four groups as is shown in Table A.6. As is also shown in Figure A.8, only eight of these innovations are identified as radical innovation whereas over half of them – 43 innovations – were considered to be incremental innovations. There are also 21 modular innovations and seven architectural innovations identified among them.

Thus, as can be seen in Figure A.8, the majority of bootleg projects result in incremental innovation. Most of these projects which resulted in incremental innovation (30 out of 45), as is clear from Table A.6, are pursued by staff. Only a small proportion of bootleg projects in this sample – 4% of 189 bootleg projects and 10% of these resulted in innovation – resulted in radical innovation. These radical innovations were pursued by senior staff and middle managers. Thus, it is not feasible to expect bootlegging to often result in radical innovation.

In terms of the success rate of these innovations, only few interviewees were able to confirm the failure and success of their bootleg projects which are shown in Figure A.9. One product innovation has already been identified as failure, 14 innovation cases that have been implemented so far have been successful. Unfortunately, it is too soon to confirm the success or failure of the majority of products and process that have been influenced by innovations resulting from bootlegging because they have not reached their markets yet.

Figure A.8: Types of innovation result from bootleg project pursued in last two years
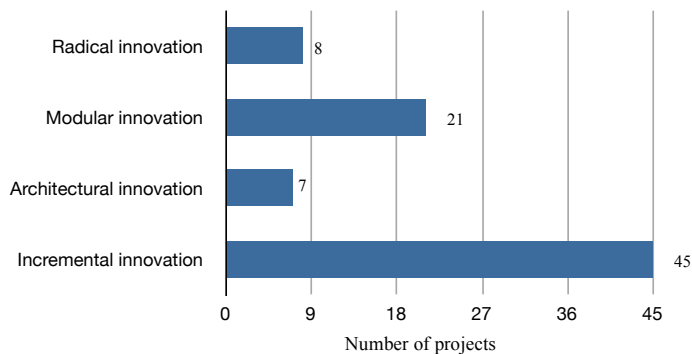
Table A.6: Type of innovation resulted from 81 bootleg projects pursued in last two years

Code	Positions	Primary Responsibility	Industry	Number of innovation	Type of innovation			
					Radical innovation	Modular innovation	Architectural innovation	Incremental innovation
1001	S	R&D	Health.	3		1		2
1002	S S	R&D	E. S. C.	2	1		1	
1003	M M	Pro Dev	IT	2	1	1		
1004	S	Pro Dev	E. S. C.	2				2
1005	S	Research	Health	1		1		
1006	M M	Pro Dev	E. S. C.	2				2
1007	M M	Pro Dev	E. S. C.	0				
1008	S S	Tech Dev	Health	2	1	1		
1009	M M	R&D	E. S. C.	2		1		1
1010	M M	Pro Dev	Health	1		1		
1011	S S	Pro Dev	E. S. C.	1		1		
1012	S	Pro Dev	E. S. C.	1				1
1013	S S	Pro Dev	Health	2				2
1014	S S	Pro Dev	Health	2	1			1
1015	M M	Pro Dev	E. S. C.	1	1			
1016	S	R&D	IT	1				1
1017	S	Pro Dev	IT	2				2
1018	S	Research	Telecom	2		1		1
1019	S	Research	IT	1		1		
1020	S	Research	E. S. C.	2				2
1021	M M	Pro Dev	Health	2		1		1
1022	S	Pro Dev	E. S. C.	2				2
1023	S	Pro Dev	Telecom	2		1		1
1024	S S	Pro Dev	Health	1				1
1025	S	Pro Dev	E. S. C.	2				2
1026	S S	Research	Telecom	2			1	1
1027	M M	Pro Dev	Health	0				
1028	S S	Research	IT	2		1		1
1029	S	Pro Dev	IT	1				1
1030	S	Tech Dev	Telecom	1		1		
1031	S S	Research	IT	0				
1032	S	Pro Dev	Health	1				1
1033	M M	Pro Dev	Health	2			1	1
1034	S S	Pro Dev	IT	4		1		3
1035	S	R&D	Health	2		1		1
1036	M M	R&D	E. S. C.	1	1			
1037	S	R&D	IT	2		1		1
1038	S	R&D	IT	2				2
1039	S S	Pro Dev	IT	2		1	1	
1040	M M	Research	Telecom	1		1		
1041	S	Pro Dev	E. S. C.	1				1
1042	S	Research	Telecom	1			1	
1043	S	R&D	IT	1				1
1044	M M	Research	Telecom	1		1		
1045	S	Research	Telecom	1		1		
1046	S	Tech Dev	Telecom	2			1	1
1047	S S	Research	IT	1	1			
1048	S	Pro Dev	E. S. C.	1				1
1049	S S	Research	Telecom	1	1			
1050	S S	Research	Telecom	1				1
1051	S	R&D	IT	2		1		1
1052	S	Pro Dev	IT	2				2
1053	S S	Research	IT	0				
1054	M M	R&D	Telecom	1				1
1055	S	Research	E. S. C.	1			1	

Key: S: Staff; **S S**: Senior Staff; **M M**: Middle Manager; **Pro Dev**: Product Development; **Tech Dev**: Technology Development;
Telecom: Telecommunication; **E. S. C.**: Electrical and electronic sensors and control systems; **Health**: Healthcare;
IT: Information Technology

Figure A.9: Success and failure rate of 81 innovations result from bootleg projects pursued in last two years
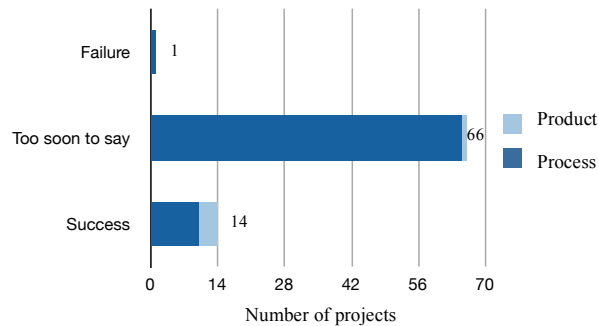
VIII.2. Other outcomes of bootleg projects pursued in last two years

Apart from 81 bootleg projects resulting in innovation, 22 projects had other benefits for their organisations. 15 projects resulted in patent applications which can be considered as invention or intellectual property of the organisation. Since these projects have not been implemented in the organisation and therefore have not directly influence any product or process, their outcomes would not be considered as innovations, rather they are called inventions.

Besides, four projects only resulted in publication of conference or academic papers; thus they are considered as knowledge creation and learning. There are also three projects pursued by one interviewee who claims these projects are better considered as problem solving as they were not unique and significant enough to be considered as innovation. Lets bear in mind that this is only based on the interviewees' judgement, as these projects were not discussed in detail.

Finally, 10 of 189 projects were rejected by decision makers after being presented to the management and therefore they did not make enough progress to have any outcomes. There are also 34 projects which failed during their underground development process

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and presumably were not revealed to the management. Thus, 44 projects have not had any outcomes. The remaining 42 projects are incomplete and therefore no specific outcomes could be considered for them.

VIII.3. Summary of outcomes of bootleg projects pursued in last two years

As a conclusion to this section, apart from 42 bootleg projects that are considered to incomplete, a significant proportion – 103 out of 147 – of completed bootleg projects discussed in this section had some sorts of benefit for their organisation. Figure A.10 shows the outcomes of completed bootleg projects that were pursued in last two years by interviewees.

Figure A.10: Outcomes of 147 completed bootleg projects pursued in last two years by interviewees

Percentage of completed bootleg projects pursued in last two years
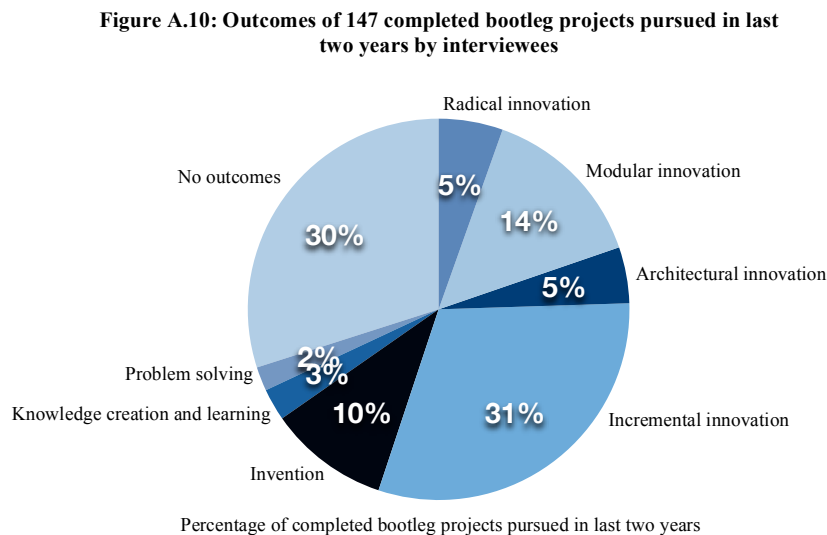
As is shown in Figure A.10, only 5% of completed projects resulted in radical innovation, whereas another 40% of bootleg projects resulted in other types of innovation, especially incremental innovation. Consequently, it is not realistic to expect

bootleg projects to result in radical innovation, as there is only a slim chance of getting radical innovation yields from bootlegging.

15% of completed bootleg projects also have other outcomes such as 10% invention, 3% knowledge creation and learning, and 2% problem solving. It must be highlighted that 30% these bootleg projects did not have any benefits or outcomes for their organisation, which is also a significant proportion of completed bootleg projects. As official project, bootleg projects also face challenges and there is a good change of failure. In general, the outcomes of bootleg projects pursued in last two years by interviewees that are covered in this section strongly confirms findings on outcomes of bootleg projects discussed in details which are presented in Chapter 7.