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DETERMINANTS OF OSS REVENUE MODEL CHOICES

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Abstract

The open source software movement is traditionally not affiliated to profit-oriented business behaviour. However, commercial activity has become increasingly common, and, business models have institutionalized in the field of open source software. The aim of this research paper is to explore the determinants of profitable revenue models for businesses based on open source software. Therefore, the study focuses on analysing different revenue options of open source software businesses as a part of more comprehensive open source software (OSS) business models. We explore other business model elements as the potential determinants of firm-level revenue model choices. This study draws on a qualitative research approach on the issue through two analytical business cases – MySQL and Red Hat – both of which illustrate the complexity and heterogeneity of solutions and options in the field of OSS. Thus, we analyse the business models of the selected case companies and identify the underlying endogenous elements, i.e. offerings, resources and relationships within them. Finally, we discuss the managerial implications derived from the cases to describe how these business model elements affect the development of successful revenue models in the field of open source software.

Keywords: Revenue models, business models, open source software, free software, software business

1 2 INTRODUCTION

Whereas the business models of the traditional providers of proprietary software are grounded, in one way or another, on the distribution of access to the use of software-related intellectual property (IP) protected by copyrights, the business models within the open source movement have to rely on other types of revenue models. This is due to the fact, that open source software (OSS) business models are based on software that is typically freely distributed or accessed by any interested party, usually even free of charge. Open source software is often mistaken for “shareware” or “freeware”, but there are significant differences between the licensing models and the processes between and within these types of software. It should be noted, however, that similarly with all “traditional” software businesses, the business models based on open source software ultimately aim at generating profits. Yet, profitability and business models of OSS are still poorly understood phenomena, and, there is no single framework that would explain the potential determinants of firm-level revenue model choices.

In this study, we make an attempt to establish a conceptual framework considering the business model elements as the endogenous determinants guiding and constraining the selection of the revenue model in the OSS business. We apply this conceptual framework in our case studies to analyze the revenue model choices in the selected OSS business cases. Thus, we pose the following research question to be answered by the study: *What are the key determinants of OSS revenue model choices?*

In other words, we aim at identifying the endogenous and firm-specific business model elements that guide, enable and constrain the choice of the firm-level revenue model options in OSS business. As a limitation to the study, we leave the exogenous factors (such as competition and other environmental factors) beyond the scope of the study.

This research paper is organized into seven chapters. After this brief introduction, we approach the open source software phenomenon through discussion on the key characteristics of open source software business. In the third chapter we focus on the types and forms of OSS revenue models. In the fourth chapter, we establish our conceptual framework to guide the analysis of our cases. In chapter five, we discuss the methodology, and, in chapter six, we

present our empirical observations through two case studies. Finally, we conclude the study in chapter seven through discussing the main theoretical and managerial implications, and, presenting suggestions for further research.

3 OPEN SOURCE SOFTWARE BUSINESS

In this chapter we discuss the background of the OSS business, typical licence OSS choices and the potential for conducting for-profit business with open source software.

3.1 The development of the OSS business

The history of open source movement draws back to the early ages of computing. In the 1960's and 1970's it was common for programmers in certain academic institutions (such as Berkeley and MIT) and corporate research centres (such as Bell Labs and Xerox's Palo Alto Research Center) to share computer program source code with other programmers. It was not until the early 1980's that proprietary software was becoming overly popular, thus causing problems to cooperative software development (Lerner and Tirole 2002). The predecessor of open source movement, the Free Software Foundation (FSF), was founded in the year 1983 by MIT employee Richard Stallman, in his attempt to formalize cooperative software development and create a complete free¹ operating system with necessary software development tools. This project came was called the GNU Project. Stallman's general concept of free software possesses four essential freedoms: (Stallman 1999)

- freedom to run the program
- freedom to modify the program
- freedom to redistribute the program and
- freedom to distribute the modified versions of the program.

Stallman didn't want to release software with restrictive copyright terms, because it would prevent certain forms of valuable cooperation. On the other hand, releasing software to the public domain would leave it vulnerable to be copyrighted and to be included in proprietary packages. Thus Stallman came up with the idea of copyleft, which means protecting the freedom of software with the means of copyright laws. In addition, copyleft ensures that the modified works are also released under copyleft terms and therefore to the use of the community. Stallman (2002) argues that: "Proprietary software developers use copyright to take away the users' freedom; we use copyright to guarantee their freedom. That's why we reverse the name, changing 'copyright' into 'copyleft'". To implement this idea, the FSF developed the GNU General Public License (GNU GPL), first of the now extensive selection of copyleft licenses that are used to protect free / open source software.

In the early 1990's the free software community got involved with a new software project that would later bring a great deal of publicity for the movement. An operating system project called Linux, developed by a young Finnish programmer Linus Torvalds, became a very popular due to the way Torvalds developed and released the software inspired participation. Everybody was invited to write code for the operating system and to correct the problems it had, though Torvalds had the final word of what was implemented to the software. The project was considered interesting, because the source code was released in a very early stage, the source code was freely downloadable to everyone and the changes to the code were released often. This method has made Linux the most popular free / open source software project ever, with an estimation of over thousand developers just for the kernel itself (Feller and Fitzgerald 2002). Meanwhile, the open anti-commercialism of Free Software Foundation led to the point where a group of free software movement leaders decided to find new ways to strengthen their cause, but with less radical means. They came up with the term "open source", which they thought would better describe the software ideals, and founded the Open Source Initiative (OSI). The idea of the organization was to promote the Open Source Definition (OSD), a set of terms for licences, which are more adaptable to commercial use than the approach FSF took. OSI has since registered certification mark and there is a variety of OSI certified licenses (including also GNU GPL and other copyleft licenses).

What motivated the birth of OSI was that the way free software was now developed. The new development model introduced in the Linux project was first described in the essay "The Cathedral and the Bazaar", written by Eric Steven Raymond, one of the founders of the OSI (Raymond 2001). The Linux development model was seen as a better way of software development that could lead to higher quality and rapid advancement. Co-operational software development was not only for ideologists and community-spirited anymore - it should be for everyone. The new emphasis born with the OSI made it possible for the business world to intensively embrace open source software. When before 1998 relatively few people in the IT industry knew about free software, a couple of years after open source was on everyone's lips. With the participation of big IT companies like IBM, Hewlett Packard and

Nokia, open source has become credible player in the IT field.

3.2 OSS licensing

Open source software (OSS), exactly defined, is software fulfilling the terms of distribution given in the Open Source Definition (OSD) and adopting a license approved by the Open Source Initiative (OSI) (Open Source Initiative 2004). Summarising the ideas behind the terms in OSD, the software license must generate the following effects:

- *Source code* must be readable and available, either included with the binary code, or publicly downloadable.
- *Free distribution* of the software, by any party, on any medium, to any party, gratis or for a fee.
- *Derivative works* must be allowed, either under similar license and or not, depending of the specific OSS license type.
- *No discrimination* against persons, groups, or fields of endeavor.

The nature of OSS is in the licensing terms and not just the accessible source code, which is just one part of the features the licensing terms generate. The licensing terms do more: they allow the free use, redistribution and modification of the software. The copyright owner preserves the moral rights and some economic rights, such as the right to dual-license (see chapter 3.2 below) the software, but transfers many important rights to the users and developers of the software, in order to enable the development of the software and to increase its adoption. It is important to understand that the OSD licensing terms allow the creation of many different types of OSS licenses, each with different qualities. Välimäki (2005) categorises OSS licenses into three different functionality classes, ranging from the most liberal to the most restrictive. The categories are: *Permissive licenses*, licenses with *standard reciprocity* obligation and licenses with *strong reciprocity* obligation. Standard reciprocity means that the distribution terms of the source code must be maintained in further developed versions. This is also called the “copyleft” effect. Strong reciprocity obligation means that in addition to the standard reciprocity effects, derivative works and adaptations must keep the licensing terms intact. This is also called the “viral” effect.

Perens (1999) identifies four key dimensions that distinguish OSS licenses and gives examples of different license types. We represent these dimensions in Table 1, together with some popular licenses, and their functional category.

Table 1 Comparison of several licenses [adapted from (Perens 1999) and (Välimäki 2005)]

License	Can be mixed with non-free software	Modifications can be taken private and not returned to author	Can be re-licensed by anyone	Contains special privileges for the original copyright holder over user’s modifications	Restrictiveness
General Public License (GPL)	No	No	No	No	Strong reciprocity
GNU Library General Purpose License	Yes	No	No	No	Standard reciprocity
Berkeley System Distribution (BSD)	Yes	Yes	No	No	Permissive
Netscape Public License	Yes	Yes	No	Yes	Standard reciprocity
Mozilla Public License ²	Yes	Yes	No	No	Standard Reciprocity
Public Domain ³	Yes	Yes	Yes	No	Permissive (Not OSS)

One of the most critical issues for open source software business is that the licensing terms allow the free redistribution of the licensed software, i.e. the licensor doesn’t necessarily gain any revenue of these copies of the software. In fact, charging a fee for OSS is usually not feasible, because a) any buyer may start to resell the software, or even give it away for free, and b) fees could severely diminish the rate at which both developers and users adopt the software product (De Laat 2005), which is in fact often the motivation behind licensing a product as OSS. Therefore it is usually not feasible to base the revenue logic on licensing fees. It is also possible to use open source software as a part of a firm’s other products, namely software packages, hardware and/or services. This approach is not free of challenges either, since the unique licensing of OSS may create risks as well as opportunities.

3.3 Business Models based on OSS

The concept of the business model in the literature on information systems, electronic business and other areas of management research refers to the ways of creating value for customers, and to the ways a business turns market opportunities into profit through sets of actors, activities and collaboration. Research on business models rests in many respects on strategy discussion and draws on strategic concepts and issues. Despite the confusion in the terminology related to strategy and business models, prior research has achieved a consensus on the position of business model as a conceptual and theoretical layer between business strategy and business processes (Osterwalder 2004; Morris et al. 2005; Tikkanen et al. 2005). Several researchers have described and analyzed the conceptual development of the business model of the firm (e.g. Papakiriakopoulos et al. 2001; Gordijn and Akkermans 2001; Pateli and Giaglis 2004). According to most recent studies, the business-model concept includes some elements of business strategy, and aims at describing the business as a manifestation derived from strategy (Rajala et al. 2003; Osterwalder 2004; Morris et al. 2005). It has also been defined as an abstraction of business (Seddon and Lewis 2003), which characterizes revenue sources and specifies where the company is positioned in its value-creating network in a specific business.

Many firms conducting business with OSS are one way or another depending on the OSS community, for developing software in their product offering, for support or for customers. However, the OSS community is outside the hierarchical control of the firms, since there are normally no contractual agreements between them. Also the idea of exploiting the financial value of jointly developed community might run against the values of the community (Dahlander and Magnusson 2005), where the code is actively protected from being appropriated by commercial firms through the use of legal and normative mechanisms (O'Mahony 2003). However, the attitudes and policies towards the commercial exploitation range within the OSS community itself, from the critical attitudes of FSF and copyleft licensing to more liberal attitude of OSI and permissive licenses (see above).

Dahlander and Magnusson (2005) propose three different approaches a firm can use to relate the OSS community. The *parasitic approach* is in question, when the firm focuses on its own benefits, without considering the possible damages to the community. As the firm doesn't share the norms, values or rules of the community, the possibility to influence the community development is non-existing. The *commensialistic approach* is about benefiting from the community, but leaving it otherwise indifferent. Since the firm isn't considered to be hostile, influencing the community is possible, but difficult. The *symbiotic approach* is in question, when the firm tries to co-develop both itself and the community. This demands heavy involvement in the community development and sharing of norms and values, but also allows influencing the community development to a desired direction.

4 OSS REVENUE MODELS

Open source software in general has been quite actively studied by scholars from various fields, such as economics, law, psychology, anthropology and computer science (Rossi 2004), however the business aspects of open source have been so far relatively little researched. Some previous studies have discussed open source licensing as strategy in competition, e.g. Berlecon Research (2002), West (2003), and Välimäki and Oksanen (2004), a tool to influence compatibility and standardisation issues and producing low-cost components (Berlecon Research 2002), a way to enhance public relations (Lerner and Tirole 2002) or learn about the development approach (Lerner and Tirole 2002). On the other hand, one part has focused on explaining the new business opportunities, identifying open source business models, e.g. Hecker (1999), Spiller and Wichmann (2002), de Laat (2005). Revenue model is seen as an inseparable element of business models in the recent research literature on software business (e.g. Pateli and Giaglis 2004, Rajala & Westerlund, 2004)

4.1 Revenue Model – An Inseparable Part of the Business Model

The essential elements of different business models are defined in different words by several researchers (e.g. Rajala et al. 2003; Hedman and Kalling 2003; Osterwalder 2004; Morris et al. 2005). Many of the studies identify a number of elements that are characteristic of different business models. These elements, expressed in different words by different authors, include: (1) offerings, (2) the resources needed to develop and implement a business model, and (3) relationships with other actors (e.g., in Timmers 2003; Osterwalder 2004; Morris et al. 2005). Finally, these elements are interconnected with (4) the revenue model (which includes sources of revenue, price-quotation principles and cost structures) that is characteristic of a particular business.

On the basis of the literature reviewed above on business models, we understand the ways in which a company

captures value and transforms it to revenue as the revenue model. In some studies, (e.g. Rajala et al. 2003, Pateli and Giaglis 2004) this element of the business model is also defined as the earning model or the revenue logic of the firm. In this paper, we consider all these terms synonymous.

4.2 Revenue Models in the OSS business

Discussion of the revenue models in the context of OSS has traditionally been problematical as the OSS movement emphasizes free distribution of intellectual property. However, since the emergence of the open source software movement, there has also coexisted a favourable attitude towards earning money, and more generally, towards profit-oriented behaviour based on the OSS (Raymond 2001).

Concerning open source as an economic phenomenon, De Laat (2005) argues that whether an enterprise involved in the open source business chooses to license its own software product as open source, or tries to benefit from existing OSS products, the ways of doing money with open source are basically the same. These ways include selling services to facilitate OSS use, selling connected hardware, and selling commercial closed applications to use with OSS. However, Hecker (1999) has identified eight possible revenue models to be applied in conjunction with open source software. These models are described in Table 2.

Table 2 Summary of OSS revenue models (Modified from Hecker 1999 and Välimäki 2005)

Revenue Model	Description	License types	Revenue sources
Support selling	A for-profit company provides support for a software that is distributed free of charge.	Any	Revenue comes from media distribution, branding, training, consulting, custom development, and post-sales support for physical goods and services.
Loss-leader	A no-charge open-source product is used as a loss leader for traditional commercial software, i.e., the software is made free by hoping that this will stimulate demand for a related offering the company has.	Varies	Complementary offerings, e.g. other software products
Widget-frosting	Companies that are in business primarily to sell hardware can use this model for enabling software such as driver and interface code. By making the needed drivers open the vendor can ensure that they are debugged and kept up to date.	Any	The company's main business is hardware. This is quite similar to the loss-leader model.
Accessorizing	Companies which distribute books, computer hardware and other physical items associated with and supportive of open-source software.	Any	Supplementary offerings
Service enabler	Open-source software is created and distributed primarily to support access to generating revenue from consulting services and on-line services.	Any	Service fees
Brand licensing	A company charges other companies for the right to use its brand names and trademarks in creating derivative products	Strong reciprocity	Copyright compensations
Sell it, Free it	A company's software products start out their product life cycle as traditional commercial products and then are converted to open-source products when appropriate.	Alteration of license type	Initial revenue from software product offerings converted into other models, e.g. the loss-leader model

Software franchising	A combination of several of the preceding models (in particular “Brand Licensing” and “Support Sellers”) in which a company authorizes others to use its brand names and trademarks in creating associated organizations doing custom software development in particular geographic areas or vertical markets,	Strong reciprocity	The franchiser supplies franchisees with training and related services in exchange for franchising fees of some sort
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Although Hecker’s list of OSS revenue models, summarized in the table above, was published as early as in 1999, it still remains as one of the most comprehensive classifications of OSS revenue models. It clearly points out that a company has a multitude of options to capture revenue with open source software.

5 CONCEPTUAL FRAMEWORK

Grounded on the above review and summation of the prior research literature, we establish a conceptual framework for analyzing the revenue models in the OSS business. The model illustrates the key endogenous business model elements and their interconnectedness with the revenue model (see Figure 1).

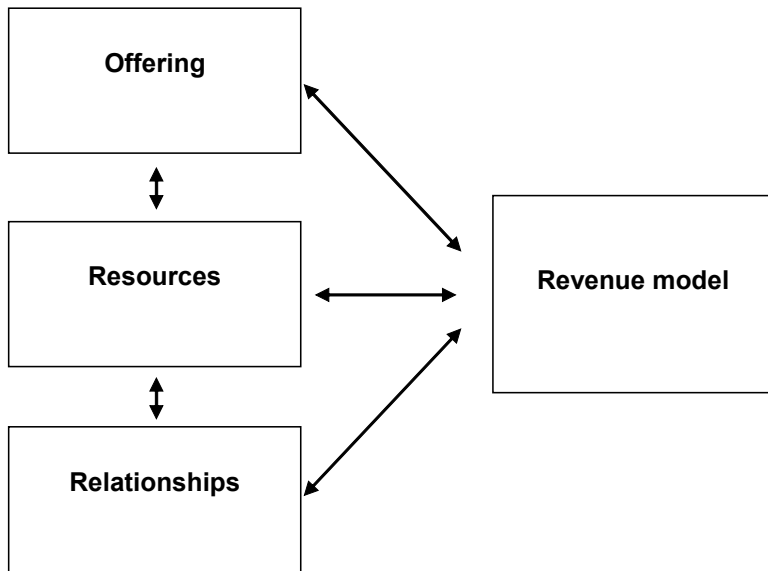


Figure 1 Conceptual Model

5.1 Offering

In the literature of business and management, the concepts of product strategies and product offerings are discussed widely (see e.g. Cravens 1987; Kotler et al. 1996). We see that offerings embody several aspects within the concept of business model, and, thus, affect the revenue model. Generally, type of offering, target market, product vs. service orientation, licensing model, etc. can be considered as aspects related to the product strategy. Correspondingly, the product offering include aspects such as complexity, the essential benefit that the customer is really buying, and, product features, styling, quality, brand name, and packaging of the product offered for sale (Kotler et al. 1996).

From the business model perspective, a defining characteristic of open source software as a product is that it is not a physical, but an information product. Information, or digital, products have unique characteristics, differing largely from those of physical products. However, certain open source business models, such as widget-frosting and accessorizing (see above), consist also of physical products. Also OSS revenue models like support selling, service enabling and software franchising are mostly comprised of service components, which also have a very different nature.

In addition to the type of offering, license types are considered as a part of the offering element in our conceptual model as a determinant of revenue model choices. Indeed, the licensing issues and commitment to the principles of

OSS licenses (GPL, etc.) are key issues related to information products such as OSS solutions (Lee 1999).

5.2 Resources

The development of resources in the industrial-network perspective is linked to its strategy (Håkansson and Snehota 1995, Gadde and Håkansson 2001, Sallinen 2002). According to this view, resources vary according to the business and product strategy. The resources and capabilities of a firm are among the central issues in understanding and analyzing its business. This accentuates the essence of resources in core competencies (Selznick 1957, Prahalad and Hamel 1990), as they are generally seen as firm-specific property that is subordinate to the core competencies. The resource-based view of the firm originated from the work of Penrose (1959) and was further developed by Wernerfelt (1984). According to Penrose (1959), bundles of resources that are activated in different ways lead to incoherent performance and heterogeneous outputs in different organizational settings.

In our analysis of the resources in the OSS business, we share the view of Metcalfe and James (2000), who define tangible and intangible assets as physical and nonphysical resources, and capabilities as intangible knowledge resources. Furthermore, we see that the increasing complexity of OSS markets makes it difficult for firms to have all the necessary resources in their possession to compete effectively. This view is consistent with the research of Ariño and de la Torre (1998). These resource-related approaches provide us with a basis on which to identify key resources in different types of OSS business models. They deepen our understanding, especially of how resources are applied and combined by a firm, and take inimitable resources as a basis for the creation of sustainable capabilities as described in other technology-intensive industries by, e.g. Hart (1995) and Gabrielsson (2004, 94-99).

5.3 Relationships

We see that the elements in our conceptual model are interrelated with each other, and, therefore, propose in consistency with Håkansson and Snehota (1995) and Rosenbröijer (1998) that capabilities of a company reflect its success in combining resources to perform activities through internal and external relationships.

Also, pointed out in the above discussion, we need to consider the interaction of companies with other actors as an inseparable part of business model, similarly with offerings and resources. Timmers (2003) points out that, in the context of business models, the focus shifts from creating value through internal activities to creating value through external relations. He identifies these relationships within the value-creating network as an important element in the development and distribution of offerings. In addition to being an important intangible company asset, a firm's network offers access to the resources of other network actors (Foss 1999, Gulati et al. 2000, Chetty and Wilson 2003, Möller & Svahn 2003).

5.4 Revenue Model

As discussed above, we identify three elements of a business model; i.e. offerings, resources and relationships, on the basis of prior literature and suggest that they enable, guide and constrain the formation of revenue model as determinants that are mainly endogenous to companies in the OSS business.

We propose that *offering* heavily affect the revenue model options through product strategy, type of value proposition and type of licensing model. The licensing and revenue model examples in the prior literature (e.g. Hecker 1999) suggest that specific types of offerings and licensing models are seen as premise for particular revenue models.

Also, we see that *resource* dependency is a crucial determinant affecting the opportunities to choose and implement a specific revenue model. For example, the core competences (resources and capabilities) in either the development or distribution of OSS solutions influence the potential to structure a revenue model.

Relationships potentially enable revenue types that would not be possible alone Timmers (2003). This is consistent with our view of that the role and position of a firm in its value-creating network have an influence on its value-capturing options, and, thus, influences the potential to form a specific revenue model.

6 METHODOLOGY

Based on a literature review, we were able to establish three sets of factors affecting the revenue model. These are offering, resources, and relationships. We illustrate our conceptual framework with descriptive cases representing

two different companies in the open source software business. The empirical study was conducted during the period of 2 years (from 2004 to 2005), and consist of two case studies of OSS companies (MySQL and RedHat). The cases were selected on the basis of the following pre-set criteria: (1) the case companies operate in the field of OSS business, (2) one of the companies exemplify in-house development approach, whilst the other exploits the development work of the OSS community, and, (3) their revenue models are verifiably successful in economic terms.

We see that explorative case studies improve understanding on the interrelatedness of these business model elements, and especially their role as determinants in setting up the revenue model. Furthermore, the cases illustrate the complexity and heterogeneity of solutions and options related to revenue models in the field of open source software business. The conceptual model derived from prior literature was illustrated and reflected through these two cases from open source software business. We suggest that our framework provides a good basis for exploring the determinants of revenue models in the OSS business.

The empirical data is collected through interviews with the senior management of one case company, MySQL, (including two interviews with both CEO and CTO of MySQL) and through collection of extensive secondary data from both of the cases. In the case of RedHat, we rely mainly on secondary sources due to that plenty of secondary data is available through the Internet, books, journals and magazines, and, due to that we did not have access to the management of the company during this phase of the study.

7 CASE STUDIES

In our preliminary conceptual framework, we identified three endogenous business model elements (i.e. offering, resources and relationships) that affect the revenue models in the OSS business. In this chapter, we illustrate these determinants and their interconnectedness with the revenue model in two empirical examples, MySQL and RedHat.

7.1 MySQL

The MySQL trademark and copyright are owned by the Swedish company MySQL AB. Two Swedes, David Axmark and Allan Larsson founded MySQL AB together with Michael “Monty” Widenius, a Finn who is broadly appreciated as the chief designer and developer of the system. The company develops and maintains its key product offering, the MySQL open source database system, in close collaboration with the OSS community over the Internet. Unlike projects such as Apache, MySQL is owned and sponsored by a single for-profit firm, MySQL AB. In addition to providing the database product under the GPL license, the company sells support through service contracts, as well as commercially-licensed copies of the MySQL database software, and employs people all over the world to communicate about the use and development of the product.

Based on the interview in 2004 with Mårten Mickos, CEO of MySQL, we sum up the history of MySQL with the following four periods. The first period during 1983-1995 laid the foundation for the OSS-oriented company culture through knowledge sharing in different programming projects between the co-founders. The key innovations developed during this period became the cornerstone of the current database product. The second period, during 1995-2000, connected the company with the worldwide OSS community after the release of the software under the GPL license. During this period, MySQL database solution emerged into the most popular open source database product in the world. In the next period, from 2001 to 2003, the company experienced strong growth with their database product. During this period, the business tenfolded in economic terms. In the fourth period, from 2004 onwards, MySQL aims at remarkable growth as a professionally managed for-profit company.

Offering. The offering of MySQL AB is a multithreaded, multi-user, SQL (Structured Query Language) relational database server (RDBS) software. The software is available either under the GNU General Public License (GPL) or under other licenses when the GPL is inapplicable to the intended use. MySQL provides database products for integrating software vendors and original component manufacturing (OCM) partners, enterprise organizations and private users in the open source software community. To distribute its offering to a large number of users worldwide, MySQL AB has applied a dual licensing principle through making the MySQL database software available in the Internet under the GPL for free, and selling it under proprietary licenses for clients where the GPL is not an ideal option, and, in situations such as inclusion of MySQL technology in closed-source products. In summary, the core offering of MySQL AB embodies an in-house developed software product and related services.

Resources. As a symbol of the key resources of MySQL AB, the chief technology officer “Monty” Widenius began

programming databases in 1981 working previously in Tapio Laakso Oy developing systems that needed data storage. Similarly, his two Swedish colleagues and later co-founders of MySQL, David Axmark and Allan Larsson collaborated in programming projects during the period of 1983-1995 and accumulated knowledge about database systems. By licensing the MySQL product under an OSS license, the company transferred their some of their internal intellectual property resources to the open source community, thus gaining possible future clients as well as developers and enthusiasts to support their offering. Also, licensing their database as OSS certainly created good will from the OSS community, to be used in managing this relationship.

The internal programming resources can still be considered as the key element in the MySQL business model. Currently, 80% of the source code in the MySQL core database product (version is 4.0) is programmed personally by “Monty” Widenius (interview with the CTO of MySQL, 2004). During the recent two years, MySQL AB has recruited several programmers to increase its in-house programming resources. In addition to the strengthening its in-house programming capabilities, the company has systematically invested in professional management resources to manage its growing for-profit business successfully.

Relationships. As described above, the collaboration based on personal relationships between the key individuals can be seen as the key determinant of success in the early phases of the MySQL product development. This open atmosphere and knowledge-sharing culture between the co-founders of MySQL AB provided a sound base for enlarging network to OSS-oriented Internet communities. The number of relationships multiplied in the mid-1990s by the rapid increase of various Internet communities, and by the institutionalization of the OSS movement.

At present, partners in the business network of MySQL include companies (such as suppliers, distributors, outsourcing service providers, other key companies in the OSS field, commercial research institutions and other strategic partners). Relationships with these actors are based on commercial multi- or bilateral activity. Furthermore, relationships in the business network include collaboration with public [governmental] organizations, research institutes, etc. (Interview with the CEO of MySQL AB, 2004)

Relationships within the OSS-community are a much more multifaceted phenomenon. According to the company CEO, the community of 5 million MySQL users includes several “ecosystems”, which produce MySQL books, articles, plus hold courses and presentations. Furthermore, these ecosystems develop applications in different OSS-projects. Currently, MySQL AB is balancing between the open source software community and commercial business networks that have somewhat disparate needs and values (Interview with the CEO of MySQL AB, 2004). We see that MySQL AB is depending on the OSS community for its ecosystems, and even more for the customer base, but they mostly conduct the product development in-house. However, the company has also made a significant contribution to the OSS community by licensing the database as an OSS. Therefore, we define MySQL’s approach towards the OSS community a symbiotic one.

The **revenue model.** MySQL AB is often cited as the “champion” of the second generation of open source projects. These projects are open source but are directed by for-profit companies. The revenues of these corporations derive from selling consulting services for their products. MySQL AB makes MySQL available under the GPL for free, and sells it under proprietary licenses for clients where the GPL is not an ideal option (such as, inclusion of MySQL technology in a closed-source product).

As of today, MySQL AB receives more income from proprietary license sales than from their other income sources, branding and services. Their main income seems to come from embedded commercial users (Välämäki 2003). In terms of Hecker (1999), the revenue models of MySQL AB include features from support selling and dual licensing, both of which can be considered as incarnations of the loss-leader model.

7.2 Red Hat

The US-based Red Hat is a world’s leading Linux software provider, and, one of the highest profile companies employing open source software in its business model. Red Hat’s offerings resemble those of a classical software vendor: Software distributed on CDs or over the Internet, deployment support, add-on products, etc. The unique aspect in the business model is that for the most part, Red Hat has not developed the software offering itself, nor paid the development for suppliers.

Company’s role in the value network is packaging, branding and distributing the open source Linux operating system, and thus making it usable for those who are not familiar with the “ins and outs” of the constantly evolving project.

Offering. Red Hat offers Linux and open source solutions into the mainstream by making high quality, low

cost technology accessible (Rappa 2005). In particular, Red Hat provides operating system software along with middleware, applications and management solutions. In recent years, the target market has shifted mainly to corporate customers, thus, influencing the heavy emphasis on enterprise Linux and network tools. Major parts of the software offering is provided under the General Public License (GPL), which governs the redistribution of source code as well as the monetary licensing rights for the binaries (Microsoft 2005). In addition, Red Hat offers support, training and consulting services to its customers worldwide and through top-tier partnerships. These services range from complete Linux migration to client-directed engineering to custom software development especially in industry-specific solutions.

Resources. From the perspective of Red Hat's business model, it is obvious that the key resources are related to brands and their development and management, as well as to marketing and business management. The funding provided by investors has enabled Red Hat to systematically develop these resources. In addition to the marketing and management capabilities, relationships with the OSS communities as the "supplier" network form a key resource in Red Hat's business model. Indeed, the company makes an extensive use of external resources for developing the software in their offering. The internal production resources include personnel and technology aimed at producing services.

Relationships. Red Hat has succeeded to establish strong ties with large enterprise and academic customers, such as Amazon.com, AOL, Merrill Lynch, Credit Suisse First Boston, DreamWorks, VeriSign, Reuters, and Morgan Stanley. In addition, their customer portfolio includes local, state and federal governments in various countries. The company also maintains key industry relationships with top hardware and software vendors like IBM, Intel, HP, Sun, Fujitsu, NEC, Hitachi, and BEA. In June 2002, Red Hat, Oracle, and Dell formally launched a combined Linux effort that includes joint development, support, and hardware and software certification. It was considered as an emphatic declaration in the strategy of Red Hat to focus on enterprise customers. Due to the sharing inherent nature of open source software, Red Hat considers "balance" as a key aspect in building a successful business without sacrificing customer trust, and in creating shareholder value without severing our ties to the open source community.

Red Hat is gaining significantly from the software produced in the OSS community. It participates in OSS and Linux development by collaborating in standards creation, and also sponsoring the Fedora Project. According to the classification of Dahlander and Magnusson (2005) presented in the theoretical part of the study, the company's approach towards the OSS community could therefore be defined as a symbiotic relationship, although the emphasis on enterprise customers embodies commensalistic elements.

The revenue model. Despite the release of software under the GPL-license mode, the services employed by Red Hat for commercial viability places a layer of restriction upon the binary and source code usage based on support contracts. This hybrid approach enables them to provide OSS solutions in a commercial way (Microsoft 2005). Thus, the primary revenue model is currently what Red Hat calls "subscriptions", and it allows the company to effectively develop and deliver their technology based on customer feedback, as well as to provide support to customers over the life of an agreement. In terms of Hecker (1999), we identify this revenue model as support selling.

It has been claimed that this is a high-margin activity demanding only a little investment (Mantarov 1999). On the other hand, little investment means lower entry barriers and support offers a very weak basis for differentiation to gain sustainable competitive advantage. Microsoft clearly has nearly a monopoly in desktop operating systems, but its market share in services related to desktop operating systems is much smaller. Thus, there is potential for revenue models based on service provisioning, as in some OSS-based businesses.

8 CONCLUSIONS

This study aims at identifying the key determinants of OSS revenue model choices. On the basis of our literature review and through our case studies, we see that there are several motives for firms to participate and contribute to the OSS movement.

As a main *theoretical implication* derived from this explorative study, we identify three endogenous business model elements that affect the firms' revenue model choices. These identified determinants include: offering, resources and relationships. The type of *offering* in terms of the user environment and, thus, the target market of the software (private vs. enterprise applications, and, desktop vs. server applications) constrain the possibilities to form a revenue model. Furthermore, the licensing model affects the revenue model choice through defining the free and commercial components, as well as the use and further development terms and conditions of the software. Firm's *resources* are of importance in constructing the revenue model. Resources and capabilities as the core competencies related to the

actor-driven development activity vs. collecting and integration of divergent OSS community-provided components into commercial product offerings strongly enable and constrain the possibilities to collect revenue based on OSS. In case of licensing products as open source software and transferring internal intellectual property resources outside the company, and thus gaining external resources (both developers and customers) as well as meritocratic value to be used in relationships. Also, *relationships* between both business actors and the OSS community form the essential external resource and capability base of the firm. Balancing between the non-commercial culture of OSS communities and for-profit business objectives are essential in terms of the development of customer loyalty (OSS-user communities in the cases of own products) and gaining trust in business relationships, and, motivating developers into activity in which some actors may benefit economically.

The *managerial implications* of this research suggest that the profit seeking firms in the field of OSS must maintain a balance between their profit-oriented business objectives and the non-commercial principles of the OSS community. This is consistent with Dahlander and Magnusson (2005), who argue that an intention to control the community development may allow the firm to manipulate the development towards their strategic goals, but might also diminish the creativity and general interest of the community towards the project.

Our empirical observations from the two case studies indicate that the selection of the revenue model is dependent of the other business model elements. For instance, the dual-licensing revenue model, used by MySQL illustrates that a changes in any of the elements of the identified key determinants may affect the revenue model choice entirely. In this model the company owns all copyrights to the software, and can therefore license the software with two different licenses, one allowing gathering of revenue from sold copies of the software, and other based on the principles of the loss-leader model.

The lesson learned from the Red Hat case is that internal resources, such as well-known brands, and superior commercialization capabilities allow a company to benefit from the development efforts of the OSS community. The business model of Red Hat is based on the ecosystem developing the core product collaboratively. The role of Red Hat in this collaboration is to deliver the results of the development work commercially added with service elements essential for the users of software.

As a limitation of the current study, we focus solely on the endogenous aspects of the business model of a firm as the determinants for the revenue model choices. Therefore, we identify the analysis of the influence of exogenous factors, such as competition and technological infrastructure, as interesting avenues for further research.

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Interviews

Interview with Michael Widenius, CTO of MySQL, 20.10.2004

Interview with Mårten Mickos, CEO of MySQL, 30.8.2004

(Footnotes)

¹ The adjective "free" here indicates to freedom and not price.

² It should be noted that Välimäki (2005) considers Mozilla Public License as a copyleft-license, although Perens (1999) has originally suggested that modifications into it can be kept in the possession of the developer and not returned to the original author. We interpret this difference to be because of what is considered a modification.