Chapter 20
Complement Management

20.1 Kinds of Complementary Relationships

As we have already seen in many places, information goods require, today, increasingly technological devices for their creation. Pross (1972, 128) speaks of secondary media

> …that transport a message to the recipient without that latter needing a device for decoding its meaning… .

Newspapers, magazines, books etc. are such secondary media which require machines for their production, but not their reception. In the days of the internet, such information goods are available not only physically, but also online, thus automatically becoming tertiary media (Pross, 1972, 128),

> …which in order to use, both transmitter and recipient require devices…

or even quaternary media, which, employing information and communication technologies, are determined

> …by the global system of telepresences… (Faßler, 2002, 147).

The resulting consequence is that information goods must always be offered in conjunction with other goods: entertainment media require a playback device, software cannot go without an operating system and hardware, and music or videos can only be downloaded from the Web if means of transmission and output devices are provided. As a consumer using information goods, one is practically always dependent on complements. Thus, it is no longer individual products which are in competition with each other, but systems of goods.

> A system is a bundle of complementary and intercompatible goods that stand in a context of utilization and which the customer considers jointly in his purchase decision (Stelzer, 2000, 838).

Among such systems are the Windows or Macintosh worlds already known to us from the chapter on standardization, the different gaming consoles or the competing DVD successors HD DVD and BluRay. Customers must be aware during their purchase that they will settle not on a single product, but on a whole package of complementary products, and perhaps even services. As we already know, indirect network effects are at play in such cases. The prevalence of a system component (e.g. of an operating system) benefits sales of complementary components (e.g. antivirus programs, organizers, installation services), and often vice versa. In this context, we must differentiate between components with limited and components with strong complementarity (Huber & Kopsch, 2002, 624). If components are of **limited** complementarity, they will increase another component's usefulness, but are not a requirement for its usage. The owner of a television set, like the owner of a Windows operating system, is able to choose from a multitude of programs, neither of which is individually necessary for the operability of the hardware/software. Not so if the relation is **strictly** complementary. Any given application will not be able to run without an operating system, a computer without an input unit or a set-top box without coded transmissions are worthless. A specific kind of complement is absolutely required in this case. Should there be no selection of options in the choice of this required complement (e.g. an application that will only run on the Macintosh operating system or the TV programs that can only be decrypted with a specific decoder), and the components only be compatibly in exactly one constellation, we can speak of **strictest** complementarity. This used to be the case, for example, in the music platform Sony Connect, closed since March 2008. The music, which was offered in Sony's own ATRAC format, could only be played on devices offered by Sony and a few licensees.

It is of stellar importance for the buyer of a system component–we will refer to the first-bought component as the primary or basic good–whether any complements are available to him, and if so how many. The decision in favor of a DVD player or a gaming console is that much easier if a comprehensive collection of films or games is available.

> Despite higher prices, consumers can be better off because compatibility allows them to assemble systems that are closer to their ideal configurations (Gilbert, 1992, 1).

The providers' endeavor must thus be to recognize complementary relations between single components and to achieve indirect network effects (Fritz, 2004, 193). In case of limited complementarity, additional components are very useful, and in case of strict complementarity they are even required, since without them the basic good would not be bought. The provider's paramount concern is thus to

put (indirect) network effects in motion in the first place. He must make sure that all the strictly complementary components are available to the customers.

20.2 Starting Points for Creating Indirect Network Effects

A possibility for exploiting complementary relationships between different components for creating network effects which we already know is the bundling strategy, in which two or more components are offered in a package and offered at a total price.

> A bundling strategy can be used by the firm to link the primary product with other compatible ancillary products, reinforcing positive feedback and thereby increasing the demand for both (Lee & O'Connor, 2003, 249).

Should a provider be unable to offer the required (strict) complements from his own product line, he must strike up appropriate cooperative partnerships. Nokia chose this path for its gaming cellphone N-Gage and cooperated with game providers in order to be able to make an attractive system offer for the launch of their product. In parallel, Nokia developed the online platform Ovi as a limited complement.

In general, it is to be assumed that without an attractive (minimum) offer of complements, system products will not be economically successful (Dietl & Royer, 2000, 328). Schilling (2002) was able to confirm this empirically on the example of diverse hardware and software offers.

However, indirect network effects now lead to a "chicken-and-egg" problem if hardware and software are offered by different companies and the provider of the basic good must rely on independent complementors (Gupta et al., 1999, 397 with further sources).

> The chicken-and-egg problem arises because hardware firms want complementors to spur sales of new hardware products by offering a wide selection of software for the new products, but complementors in turn want to wait until the new hardware products have achieved significant market penetration, before committing to the new hardware platforms. Neither the hardware firms nor the software complementors want to move first to invest in market creation (Gupta et al., 1999, 397).

This problem can be found on many markets (see Table 20.1). As of now, we can observe it in Amazon's endeavors in the establishment of eBooks. Amazon offers access to several hundred thousand electronically available titles for its hardware, the Kindle 2.0, as well as subscriptions to magazines and blogs (Postinett, 2009). In order for indirect network effects to arise, the basic good and the complements

are needed simultaneously, as the customer would want to buy them at the same time and not with a time delay between the two. Compared with the first eBook reader, the Rocket eBook, which entered the market in 1999 and left it shortly afterward, Amazon has a good starting position regarding their technology and their content base. The bargaining power as the world's biggest bookseller secures the basic offer of content, which is so important for success. Whether the small variety of reading devices–apart from Amazon, Sony has a large market share–and the prominently book-based content will be enough to lead to success, remains to be seen. Google is competing strongly, currently making around 1.5m titles available for cellphones via Google Book Search (Postinett, 2009). A new standardization struggle is in the works.

Market	**Basic Good Provider**	**Complement Provider**	**Form of "Chicken-and-Egg" Problem**
DVD Players	Hardware providers, e.g. Sony, RCA, Philips	• Film studios • Video rental services	Sales of DVD players vs. content and availability of rental movies
Personal Digital Assistants (PDAs)	Hardware providers, e.g. Apple, 3Com, Casio	• Independent software providers	PDA sales vs. software applications
eBooks	Hardware providers, e.g. Softbook, RocketBook, Everybook	• Book publishers	Prevalence of eBooks vs. availability of content
Network Computers	Hardware providers, e.g. Oracle, IBM, Sun	• Independent Java software programmers	Sales of network computers vs. Java-based applications
Operating Systems	Providers of operating systems, e.g. Microsoft, Apple, Sun	• Hardware providers • Independent software providers	Installed base of operating systems vs. availability of hardware and software

Table 20.1: Examples for Chicken-and-Egg Problems on Markets with Indirect Network Effects. Source: Following Gupta et al., 1999, 398.

Gupta et al. (1999) demonstrate how existentially important an attractive offer of complements is on the example of television. Sales of color television sets, which for a long time had proceeded rather slowly, increased abruptly after a broad offer of TV programs in color became available (Gupta et al., 1999, 412 et seq.). The authors arrive at the conclusion that the same principle holds for digital television (HDTV):

> HDTV will be a niche product, and will diffuse slower than originally expected due in part to the lack of programming (Gupta et al., 1999, 396).

As long as there is an insufficient range of complements, lowering the price for the basic good that is the HDTV television set will not be the key to success either. Other than during the introduction of the fax machine, where direct network effects were meant to take hold and lowered prices managed to act as drivers, the focus here is on indirect network effects. The customers want television and programming. Premature price reductions will only lead to unnecessary losses, and not to a fast upgrading of the complement offer (Gupta et al., 1999, 411 et seq.).

A very central role in dealing with complements is taken by signaling. Product announcements in particular are an extremely effective instrument for making complementors provide an appropriate range of complements for a basic good. This will be discussed further in Chapter 22 on Signaling.

20.3 Strategic Variants of the Complement Range

Here, too, a provider must decide–similarly to the behavior options in the standardization competition described in Chapter 19–how the offer of complements should come about. The fundamental variants to choose from are the sole provider strategy and the cooperation strategy (Ehrhardt, 2001, 170 et seq.).

The **sole provider** creates a minimum offer of complementary goods by himself. This is the case, for example, if the manufacturer of a basic good, such as a gaming console or a CD/DVD player, provides a sufficient amount of video games, music or films in time for the product launch. This is what Nintendo does in developing its own games, and Sony in providing Blu-Ray discs with in-house content (Sony-BMG). If the provider does not have sufficient competences for creating complements by himself, but sufficient financial means, forward integration will be an option, in which other companies are taken over as strategic acquisitions. This is the path Sony chose in order to provide content for the CD and the Minidisc: in 1987, it bought CBS Records. The purchasing price of $2bn, which was extremely high at the time, showed what great significance Sony ascribed to the offer of complementary products (Grindley, 1995, 121). If the offers of the basic good and the complements come from a single source, the possible innovation transfer will bring about clear advantages. One reason for the strong market

position of Microsoft Office as a complement for the operating system Windows is the fact that Microsoft knows earlier than other providers which new features will appear in a Windows update, meaning that the development of the application software can be adjusted much earlier and more precisely (Kurian & Burgelman, 1996, 283). The risk of engaging in two markets is double, though, as apart from the basic good, one has to assume the burden of any malinvestments in developing the range of complements.

The **cooperation strategy** is different: the more partners one can get on board for providing complements, the more broadly the risk can be spread. A very successful example of cooperation is that of Microsoft and AOL (Ehrhardt, 2001, 173 et seq.). Microsoft's Internet Explorer became the standard browser for AOL in 1996 via a cooperation agreement. In return, AOL was allowed to place its logo on the Windows interface instead of Microsoft Network (MSN) and was thus made the default online service. The annoying competitor Netscape was thus relegated to runner-up, even though Microsoft entered the browser market at a relatively late stage. Such strategic partnerships or alliances can also involve many different parties. Toshiba and Sony both chose this path in supporting their DVD successor technologies, rallying companies from consumer electronics as well as the computer, gaming and media industry round them in order to support their format. Sony managed to build the more potent alliance and emerged victorious.

Additionally, Shapiro and Varian (1999, 23) recommend that the provider of a basic good create as lively a competition for complementary offers as possible. An intense competition should lead to a differentiated product range and low prices, which will ultimately benefit sales of the basic good. The strategies used here can, but don't have to, involve providing complements oneself. Microsoft, for instance, has for years been pursuing the strategy of buying up successful product developments (Shapiro & Varian, 1999, 23). Many startups in the software industry even actively pursue the goal of being taken over by Microsoft after a successful start.

Another variant of invigorating the market can consist of subsidizing complementors. 3DO, the first provider of 32-bit CD-ROM hardware and software technology for video games, pursued this path (Nalebuff & Brandenburger, 1996, 113 et seq.). In order to heat up the competition between the hardware providers, licenses for manufacturing hardware were given out for free, whereupon a crowd of providers entered the market. In order to force sales, sluggish at first, and to build up an installed base more quickly, 3DO began to additionally subsidize the hardware prices. The necessary impetuses for price reduction consisted of investment offers in 3DO and the software licensing fees. In order to support the range of games on offer, 3DO began developing their own. In spite of this sophisticated strategy, 3DO was unable to dominate the market, as Sega and Sony established themselves as competitors too early, before Nintendo took the next technological step shortly after in developing its 64-bit hardware.

Here we can link to our previous deliberations in standardization. The creation of standards is a very effective option for driving the creation of complementary offers by third parties forward. Here it is not the compatibility between different basic goods, but that between basic good and complement which is important.

Compatible components benefit the occurrence and effectiveness of indirect network effects:

> Standardization feeds the reinforcing cycle between primary and ancillary products, since compatibility is normally maintained by adhering to a common technological standard (Lee & O'Connor, 2003, 243).

20.4 Conclusion

Only available in the printed version.

20.5 Bibliography

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