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The business dynamics in telecommunication market consolidation

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THE BUSINESS DYNAMICS IN TELECOMMUNICATION MARKET CONSOLIDATION

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Abstract

The Swiss telecommunication market is quite different from the markets in surrounding European countries. The Swiss Market is characterized by a very small number of competitors and relatively high and stable prices. The model in this thesis explains shows how the limited competition enables the mobile telecommunication service providers to keep prices up. This is due to a oligopoly market situation linked to complicated laws that discourage new competitors to join the Swiss market.

Later in 2006, the Swiss federal council will pass the new televisor law, which will make it significantly easier to join the Swiss market. This will most likely result in lower prices for Swiss mobile telecommunication users.

1. The Field of System Theory

1.1 Introduction

“It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.”[1]

The greatest constant in our times is change. Our world is changing at an accelerating speed - economically, socially and politically. Information technology plays a crucial role as an enabler in this transformation. Some of the changes are positive, some negative. Emerging markets such as China, India and Brazil profit from Globalization, while other countries are left behind. The chances of economic recovery of most African countries are smaller than ever due to the Information Technology divide, often called Information gap.

The causes for change are versatile and often hard to comprehend. Systems theory is a relatively young interdisciplinary field, which can be utilized to describe and explain complex phenomena. Analyzing the structure of a model and its functions can help to predict how the system will react in specific situations. Systems theory can help decision makers to understand complex combination of circumstances, improve the quality of their decisions and adapt to new situations faster and more successful.

After all – “change is inevitable - except from a vending machine.”[2]

The term system (from the Latin (systema), and Greek σύστημα (sustēma))[3] describes an assemblage of elements and the relationships among those elements. Any element which shares no relationship with any other element of the system is not a part of that system.

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[1] Author unknown, commonly misattributed to Charles Darwin
[2] Robert C. Gallagher
3 http://en.wikipedia.org/wiki/System

The entities of a system interface in order to facilitate the 'flow' of information, energy or matter.[4] Systems theory examines the interdependence of these relationships and how the entities are organized within a particular system.

Systems theory methods enjoy popularity across various academic fields and have been applied to many different disciplines such as physics, sociology, chemistry and biology. Very prominent is the application of system dynamics within sociology, better known as social dynamics. A more detailed description of social dynamics and Niklas Luhmann will be given later in this chapter.

In reality, many systems are to complex to research. A scientific model is a conceptual or abstract representation of the reality. The purpose of such a model is to reduce complexity through focusing only on certain aspects which determine the area of interest. The process of modeling is often difficult, because the modeler has to make trade off decisions between complexity and accuracy. A mental model describes the thought process of the modeler and how he thinks the elements of the system interact with each other.

1.2 The History of Systems Theory

Systems theory is a relatively young academic discipline. The foundation stone was set during the first half of the 20th Century. The industrial revolution created demand for more sophisticated management methods and instruments to control and administrate complex projects and production processes. Economies and societies underwent a phase of tremendous change.

Change in industrial production was just one aspect of this remarkable time. Academic research began to address elementary questions such as evolution and the structures and functions that determine the processes within a system.

4 Einführung in die Systemwissenschaft, Prof. Dr. Michael Matthies, 2002

This new research approach was adapted by scientists in all major fields (biology, chemistry, physics, sociology, and tectonics). This is the reason why systems theory has slightly different meanings in variable fields.

Karl Ludwig von Bertalanffy was the first to realize and promote the potential and importance of a holistic systems theory. His goal was to detect interdisciplinary similarities among the "sub disciplines" of systems theory.[5] He is often referred to as the "father of systems theory".

Figure 1.1: Karl Ludwig von Bertalanffy[6]
Born September 19, 1901 in Wien (Austria); † June 12, 1972 in New York (U.S.A.)[7]

Because of his crucial role in the development of systems theory, it is worth knowing more about this revolutionary thinker. Ludwig von Bertalanffy was born in Atzgersdorf, a village near Vienna on September 19, 1901.[8] By the age of 18 he began his studies of philosophy and art history at the University of Innsbruck (Austria). Two years after completing his PhD studies, he published his first book "Modern Theories of Development". In this book he describes how biological systems are self-governed by organizational dynamics. The organismic system theory was born.

[5] Einführung in die Systemwissenschaft, Prof. Dr. Michael Matthies, 2002
[6] Source of picture : http://www.pensament.com/filoxarxa/novesimatges/bertalanffy1.jpg
[7] http://de.wikipedia.org/wiki/Ludwig_von_Bertalanffy
[8] http://www.psy.pdx.edu/PsiCafe/KeyTheorists/vonBertalanffy.htm

His ambition was to unite growth, morphogenesis, metabolism and sense physiology to a dynamic theory of stationary open systems.[9] After his habilitation, he went to the University of Chicago. It was there, where he gave his first lecture, which proposed that the General System theory as a mythology could be applied to all sciences. In the 1940's he concretized his theory of open systems. In contrast to a closed system in a kinetic reversible equilibrium, a dynamically irreversible steady state determines an open system. General systems show a sort of self-regulation and self-governing behavior, comparable to activities of organic systems. Bertalanffy's general system theory had a significant impact on model construction in all the sciences. Unlike the mathematical system theory, the general system theory describes its models in a qualitative and non-formalized language. Bertalanffy created a universal language which was applicable to all models and sciences. Cybernetics is the study of control and communication, typically involving self-regulatory feedback (feedback loops) in living organisms, machines and sociotechnical systems. There exist many definitions of cybernetics and many individuals who have influenced the cybernetic theory. According to Bertalanffy, cybernetic feedback loops are a special class of self-regulating systems. Bertalanffy proclaims the existence of a fundamental difference between the general system theory and the cybernetic theory. Feedback loops are governed by constraints whilst dynamic systems are exhibiting the free interplay of forces. Moreover, the regulative mechanisms of cybernetic systems are based on pre-determined structures and functions.[10] After being appointed Professor for Theoretical Biology of the Department of Zoology and Psychology at the University of Alberta in Edmonton (Canada) in 1960, Bertalanffy, Royce and Tenneysen founded the Advanced Center for Theoretical Psychology.

[9] http://www.isss.org/lumLVB.htm
[10] http://www.isss.org/lumLVB.htm

During that time, Bertalanffy's system theoretical approach concentrated on the modern world of technology that has alienated human beings from nature and from each other. Bertalanffy soon realized the existential importance of overcoming this individual isolation. After his retirement, Bertalanffy became a Professor of the Faculty of Social Sciences at the State University of New York (SUNY). In June 1972, he suffered a heart stroke and died a few days later, on June 12, in the hospital.[11] While Bertalanffy is considered the father of the general system theory, the same title is given the US mathematician for the theory of cybernetics.

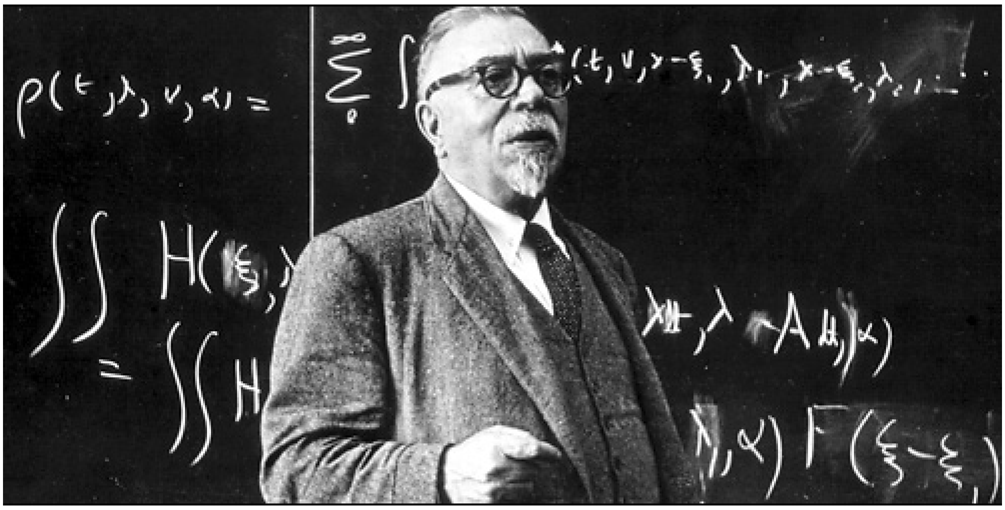

Figure 1.2: Norbert Wiener[12]
Born November 26, 1894 in Columbia, Missouri; † March 18, 1964 in Stockholm (Sweden)[13]

Norbert Wiener was born in Columbia (Missouri) on November 26 1894. His father, Leo Wiener, was a Russian immigrant from Byelostok. Leo Wiener was determined to make his son an outstanding student. Norbert Wiener completed his PhD studies at Harvard at the age of 18. Afterwards he went to Cambridge (England) to study Mathematics, Philosophy and Logic.

[11] http://de.wikipedia.org/wiki/Ludwig_von_Bertalanffy
[12] Source of picture: http://www.adeptis.ru/vinci/norbert_wiener8.jpg
[13] http://de.wikipedia.org/wiki/Norbert_Wiener

He then became an instructor of Mathematics at MIT in 1919. He was promoted to Assistant Professor in 1929 and Professor in 1931. In l940 he began to contribute in a research project at MIT on anti-aircraft devices.

Wiener faced the challenge of improving the accuracy of anti-aircraft guns. Anti-aircraft gunners must shoot ahead of where the target is at the time of firing. The direction and distance ahead must be estimated by the person operating the anti-aircraft gun. The method of estimation has to be as quick and as accurate as possible.

Where to aim is based on knowledge and prior experience of how the plane has been traveling and where it is likely to aviate in the time the projectile takes to reach the hostile aircraft. The gunner has to anticipate the evasion of the pilot and incorporate the laws of physics.

Wiener combined his mathematical prediction equations with analog computers. His goal was automatic aiming by combining the anti-aircraft guns directly with radar detection. Motors and hydraulics attached to the gun stand could automatically position and aim the gun under the control of data computed by the mathematical model processing input from the radar. As radar became more accurate the process was automated to the point where no human interaction was needed to operate an anti-aircraft gun. This project played a central role in his reflections upon what was to become the science of Cybernetics.[14]

In 1948 he published his book “Cybernetics or Control and Communication in the Animal and the Machine” As mentioned earlier, it is very hard to define cybernetics. The following is a list of definitions from respected scholars.

[14] http://www.isss.org/lumwiener.htm

Cybernetics is…

…"the science of control and communication in the animal and the machine"[15]

…"the art of governing or the science of government"[16]

"So a great variety of systems in technology and in living nature follow the feedback scheme, and it is well-known that a new discipline, called Cybernetics, was introduced by Norbert Wiener to deal with these phenomena. The theory tries to show that mechanisms of a feedback nature are the base of teleological or purposeful behavior in man-made machines as well as in living organisms, and in social systems."[17]

Derived from the Greek "kubernetike" (the art of the steersman), cybernetics involves the theory of regulation and of signal transmission applied to living organisms and technical devices. The term feedback system (feedback loops) was created by Wiener. It will be explained in detail the following chapter.

The book "Limits to Growth", written by Donella H. Meadows, Dennis L. Meadows, Jorgen Randers and William W. Behrens III in 1972, created big mainly because of its critical analysis of world population growth. The scenarios described in the book visualized how finite resources set limits to industrial production and world consumption. Thanks to this book many people started thinking about sustainable growth and environmental protection. As awareness of issues such as the hole in the ozone layer and climate change increased, people started to realize that the environment is a system directly influenced by our actions. Since then people argue that environmental considerations should play a more dominant role in politics and economy.

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[15] by Norbert Wiener
[16] by A. M. Ampere
[17] by Karl Ludwig von Bertalanffy

The book “Limits to Growth” was based on Jay Wright Forrester’s concept of business dynamics.

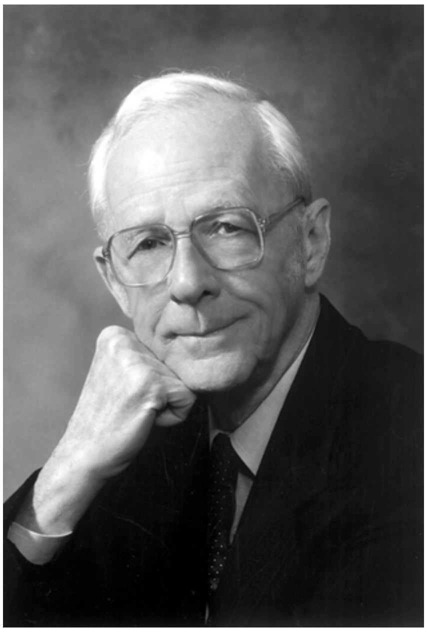

Figure 1.3: Jay Wright Forrester[18]
Born July 14, 1918 in Nebraska

Forrester began his graduate studies in electrical engineering in 1939 at MIT. Here he worked under Professor Gordon as a research assistant. The MIT Servomechanism Laboratory conducted research in feedback control mechanisms for military equipment.

Jay Forrester soon shifted his research to the design of an aircraft flight simulator for the U.S. Navy. He had the revolutionary idea to base this simulator on a digital computer. He then soon realized the true potential of digital computers and computerized combat information systems. Under his direction, the MIT Digital Computer Laboratory was founded in 1947. The first project of this laboratory was called Whirlwind I, a digital computer capable of handling various tasks.

[18] Source of picture: http://www.daedalus.es/img/forrester.jpg

In the process of creating this new computer, Forrester invented and patented magnetic random-access memory (RAM), which was industry standard for computer memory for over 20 years.

After the Whirlwind I project, Forrester worked on the SAGE project. SAGE stands for Semi-Automatic Ground Environment air defense system. The SAGE computer system designed by Forrester ran extremely stable and was in service for over twenty-five years.

In 1956, Forrester accepted an offer to lecture at the MIT School of Management. Forrester applied his science and engineering background to complex managerial problems, which led to the creation of system dynamics. He soon applied this new concept in real life, when he advised the management of GE.

System dynamics was applied almost exclusively to managerial problems until Forrester met John Collins, the former mayor of Boston.
Sharing offices next to each other, the two began to discuss problems of cities. Forrester was confident that applying system dynamics to this type of problems would help finding better solutions. [19]

Forrester and Collins published the book titled Urban Dynamics. The Urban Dynamics model was the first major non-managerial application of system dynamics. The model explains the inefficiency of many urban policies and was therefore highly controversial. In 1970 Jay Forrester went to Bern (Switzerland) to meet with the Club of Rome. “The Club of Rome’s mission is to act as a global catalyst of change that is free of any political, ideological or business interest. The Club of Rome contributes to the solution of what it calls the world problematique, the complex set of the most crucial problems – political, social, economic, technological, environmental, psychological and cultural - facing humanity.

[19] http://www.albany.edu/cpr/sds/DL-IntroSysDyn/origin.htm

It does so taking a global, long term and interdisciplinary perspective aware of the increasing interdependence of nations and the globalization of problems that pose predicaments beyond the capacity of individual countries.”[20]

During the meeting, Forrester was asked if system dynamics could be applied to the global problems of humanity. His answer was yes and he started working on his first draft during the flight from Switzerland back to the U.S.A.

Forrester substantiated his socioeconomic model and published it in the book titled “World Dynamics”.

The model visualized important interrelationships between world population, food, industrial production, pollution and resources. The model predicted a collapse of the world socioeconomic system in case no adjusting policy reforms would happen.

The Club of Rome was fascinated by world dynamics and offered to fund an extended study. Forrester suggested his former Ph.D. student Dennis Meadows for the research position. As mentioned earlier, Meadows and his colleagues published their model in the book titled “The Limits to Growth”.[21]

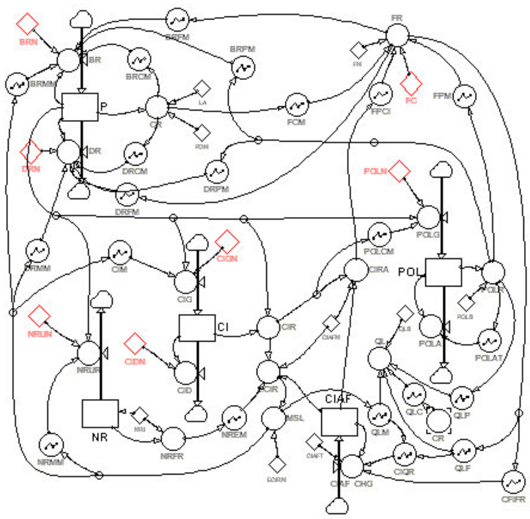

Figure 1.4: Forrester’s World Dynamics Model Draft

[20] http://clubofrome.org/about/index.php
[21] http://www.albany.edu/cpr/sds/DL-IntroSysDyn/origin.htm

1.3 The Entities in a System Dynamics Model

System dynamics uses a specific diagramming notation for stocks and flows. Stocks are drawn as rectangles. In literature the analogy to a bathtub is often made. The bathtub is the entity that represents a stock meaning a certain amount of water. To fill the bathtub one has to put water in it. The water stream into the bathtub represents a inflow, represented by a pipe (arrow) going into the stock.

After the bath, one has to drain off the bathtub. This is a outflow, represented by a pipe coming out of the stock (bathtub). Inflows are increasing the level of the stock while outflows do the opposite.

Valves control the flows inward and outward of the stock. One might ask, where did the water come from and where did it go after the bath. If the source and the final destination of the water is not relevant to our model, or the structures the model analyzes, those two entities are represented by clouds. These clouds have unlimited capacity. Variables are related by casual links represented by lines or arrows. Each links has a polarity, either negative or positive. A negative link means that if A increases, B will decrease where B is the effect of cause A. Should A decrease B will increase. A positive link means that in case A increases so does effect B. Should A decrease, B will show the same tendency.

All these relationships/links can form a feedback loop. Is the feedback loop positively polarized, that specific feedback loop will experience growth. A negative polarization will create a goal seeking feedback loop. This means that type of system tends towards a equilibrium. A very good example for this is an air condition unit in a house. The owner of the house will set the air condition control device to a temperature he would like to have consistently during all times. As soon as the air gets to warm inside the house, the air condition starts cooling down until the room temperature is getting below the previously specified temperature.

This process of measuring and cooling the air will repeat itself and the average room temperature will be around the equilibrium point, the temperature specified by the home owner. Negative feedback loops seek stasis and balance. Positive feedback loops generate growth and reinforce change. A good example for this is the dynamic creation process of slums. As crime in a certain area increases and quality of living decreases, rents become cheaper and attract people with lower education and financial stability. This will further decrease the quality of living in this area. A self dynamic process is started which is very hard to stop.[22]

All systems, no matter how complex consist of networks of negative and positive feedback loops. All dynamic processes are a direct result of the interaction of these loops with each other.

1.4 The History of Telecommunication

The word telecommunication is a combination of tele, the Greek word for far or remote and the Latin word communicare, which means to inform someone or exchange information. Telecommunication describes the process of exchanging Information over a long distance without a physical medium such as a letter. Based on this definition, telecommunication started with smoke signals (visual telecommunication) and drums (audio telecommunication).

Technological improvements in electronics had a immense impact on telecommunication and improved the quality and reach of telecommunication systems. The time span from the first electromagnetic telegraph to the internet can be divided in three phases:

- The telegraph and telephone period
- The radio and television period, and the
- Internet period.

[22] Business Dynamics, John D. Sterman, p 108

Telegraphy describes the process of transmitting messages over a certain distance. In contrast to telephone, the message cannot be in spoken language but must be encrypted into code. Another disadvantage of telegraph technology compared to telephone is that the message can only be submitted in one way. The oldest form is the optical telegraphy. Morse-telegraphy is still used in seafaring. Two examples of optical Morse-telegraphy: Flag signals…

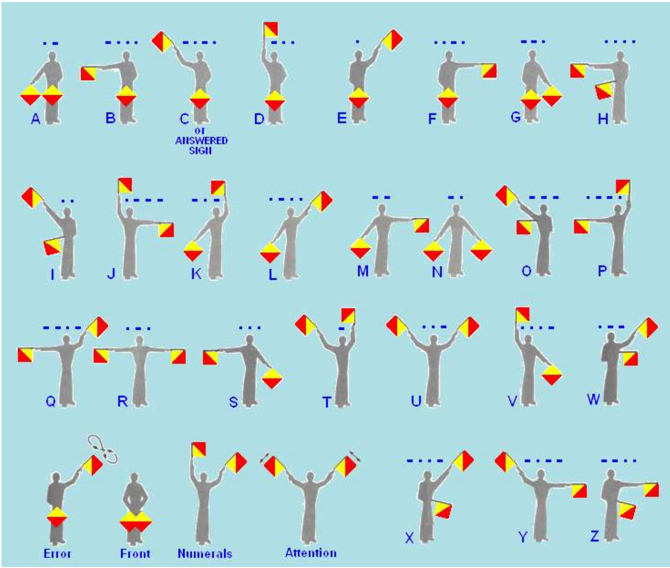

Figure 1.5: The Semaphore flag signaling system[23]

…and the Morse code (World Standard).

A	.-	M	--	Y	-.--	6	-....
B	-...	N	-.	Z	--..	7	--...
C	-.-.	O	---	Ä	.-.-	8	---..
D	-..	P	.--.	Ö	---.	9	----.
E	.	Q	--.-	Ü	..--	.	.-.-.-
F	..-.	R	.-.	Ch	----	,	--..--
G	--.	S	...	0	-----	?	..--..
H	....	T	-	1	.----	!	..--.
I	..	U	..-	2	..---	:	---...
J	.---	V	...-	3	...--	“	.-..-.
K	-.-	W	.--	4	....-	‘	.----.
L	.-..	X	-..-	5	.....	=	-...-

Figure 1.6: World Standard Morse code[24]

What you hopefully never have to remember is the code **... --- ...** SOS.

[23] http://navy.memorieshop.com/Adair/Cruise-Book/Flag-signals.jpg
[24] http://homepage.ntlworld.com/dmitrismirnov/morse-tab1.JPG

The Morse code was developed by Samuel F. B. Morse. His code was ideal for transmission over electrical telegraphy networks. Electrical telegraphy is based on the fact that electricity can travel long distances at a high speed over a wire cable. This technology was adopted globally and the first global network came into existence. This was the time when the first press agencies, Associated Press and Reuters were founded. The first submarine cables were installed in 1839, but it took 18 more years for the first successful transmission between Europe and North America.

Ferdinand Braun and Guglielmo Marconi received the Nobel price in physics for their contribution to radiotelegraphy in 1909. Marconi successfully established a radio connection over the British channel in 1899 and a transatlantic radio connection in 1901.

"Wire telegraph is a kind of a very, very long cat. You pull his tail in New York and his head is meowing in Los Angeles. And radio operates exactly the same way. The only difference is that there is no cat."[25]

Scientists and physicians quickly realized the enormous potential of radio transmission. They improved the quality of the transmissions and found new applications of this technology. In the 1870s, the two inventors Alexander Graham Bell and Elisha Gray independently and simultaneously designed communication devices that could transmit speech electrically. The telephone was born. Bell finally won the legal battle for the patents. The telegraph was a very successful technology but was just able to send or receive one coded message at a time.

The user friendliness of the telephone (just speech, no coding) and the possibility of sending various messages simultaneously over the same medium made the telephone technology an instant success.[26]

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[25] by Albert Einstein

Telephone technology was a big success but had nowhere the impact on society as Television. Television is a combination of tele, the Greek word for far and the Latin word visio or visus, which means seeing or vision.

Television is a technology able to broadcast and receive moving pictures and sound. The quality of the picture (from black & white TV to High Definition TV) and the sound (from Stereo to Dolby Digital 5.1) is continuously improving. Today, television is the mass media with the highest per capita consumption. Television has become the number one source for information, entertainment and sports. Since the 90's a new technology has emerged and transforms our lives economically, socially and politically. Global Internet usage statistics show, that more than 1 billion people have access to the World Wide Web and usage grew by impressive 180% between 2000 and 2005.[27]

The convergence of personal computers, telecommunication technology, television and proprietary content providers will revolutionize the way we use those technologies. It will also create new and better products. A good example for phenomena is VoIP (Voice over IP) telecommunication. VoiP telephony is the transfer of voice conversations (audio) over IP-based networks[28]. This technology is extremely cheap, especially for long distance calls. Free consumer applications are very popular because they also feature webcam features. Skype is a good example and also one of the most downloaded applications today.

1.5 The History of Telecommunication in Switzerland

This tabular overview is provided by Swisscom and displays the telecommunication history of Switzerland. It is the history of PTT, the federal post and communication office which had the monopoly until 1998.

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[26] http://inventors.about.com/library/inventors/bltelephone.htm
[27] http://www.internetworldstats.com/stats.htm
[28] http://en.wikipedia.org/wiki/Voip

1989 PTT adopts a new corporate strategy and splits PTT into two divisions, post office and telecommunications. This is an overview from 1852 until 1998, when the Swiss telecommunication market was deregulated.

1852: The birth of telecommunications in Switzerland: the first public telegraph service between St. Gallen and Zurich opens on 15 July. The Federal Council appoints Zurich-born Johannes Wild director of the new wire service.

1878: The federal government's monopoly now includes telephony although the principle of private concessions is upheld.

1880: Installation of the first manual switchboards.

1885: The Swiss Confederation buys back the Zurich network, which is lagging behind the rest of the Swiss telephone network.

1890: Introduction of telephone numbers. Up until now, it has been possible to ring people up on the basis of name alone.

1896: Telephone introduced in all Swiss cantons.

1911: The Ecole d´horlogerie in La Chaux-de-Fonds receives the first concession for reception of the time signal transmitted from the Eiffel Tower.

1917: Zurich-Hottingen, first semi-automatic switchboard goes into operation.

1921: Directory inquiries goes into operation.

1936: First coin-operated public telephone goes into operation.

1948: Switzerland boasts 500,000 telephone subscribers.

1952: Introduction of the first transalpine directional transmitter (Berne - Lugano, via Jungfraujoch) brings the Swiss network up to date.

1953: Pilot project at the Studio Bellerive in Zurich marks the dawn of the television era. Switzerland opts for the 625-line standard.

1956: People on both sides of the Atlantic are now able to ring each other up, thanks to the first transatlantic telephone cable. Launch of the second VHF radio channel.

1958: Black-and-white television is here to stay.

1959: Switzerland boasts one million telephone subscribers. Transformation of the last manually operated switchboard in Schuls makes the Swiss network the world's first fully automated telephone network.

1962: Telstar: launch of the first telecommunications satellite.

1963: Introduction of pulse metering (10 centimes per pulse) for local and trunk calls.

1964: Expo 64 in Lausanne: presentation of the first exchange to permit international direct dialing.

1965: USA: Early Bird (Intelsat I), the first geo-stationary telecommunications satellite successfully goes into orbit.

1966: Subscribers in Montreux become the first to make international telephone calls by direct dialing.

1968: Advent of (PAL standard) color television, starting with the winter Olympics in Grenoble.

1971: Switzerland boasts two million telephone subscribers. First computer-assisted telegram service goes into operation.

1974: Satellite earth station goes into operation at Leuk in the Canton of Wallis.

1975: Switzerland's postal and telecommunications services (PTT) decide to introduce a mobile telephone network (NATEL = National Auto Telephone Network) for vehicles as part of the Federal Council's effort to boost the Swiss economy.

1976: First digital long-distance data telecommunication network goes into operation (2 Mbit/s).

1978: Launch of the first Natel A network marks the beginning of the remarkable success story of mobile telephony in Switzerland.

1980: Pilot launch of the fax machine.

1982: Switzerland boasts three million telephone subscribers. International direct dialing now available to all subscribers.

1983: Natel B network goes into operation. The precursor of today's mobile phones is a 12-kg radio phone that comes complete with a carrier case. Federal Council gives the green light for experimental operation of 36 local radio stations.

1984: Beginning of the end for the big telephone monopolies: Great Britain privatizes British Telecom and AT&T loses its monopoly of the US market.

1985: The first fiber-optic cable between Berne and Neuchatel goes into operation (at 140 Mbit/s).

1987: Launch of the Natel C network paves the way for modern mobile telephony.

1988: Switzerland's first digital telecommunications network goes into operation with the launch of «Swissnet 1» based on ISDN (Integrated Services Digital Network) technology. EU: liberalization of the telecoms terminals market.

1989: PTT adopts new corporate strategy: post office and telecommunications divisions to focus on their core businesses.

1992: Telecommunications act liberalizing value-added services (such as digital data communications) and terminals becomes law. Natel D (digital, cellular mobile telephone network) goes into operation.

1996: New telephone numbers for the whole country. Instead of 52 network groups, there are now only 18. Mobile network boasts 500,000 subscribers (300,000 Natel C; 200,000 Natel D). Natel easy: first pre-paid card for Natel D.

1997: Parliament passes a new Telecommunications Act (FMG) and Telecommunications Enterprise Act (TUG), which together result in full liberalization of the market and conversion of Telecom PTT into a special public limited company.

Mobile telephony boasts one million subscribers (200,000 Natel C; 800,000 Natel D). Teleguide, an electronic phone directory, replaces the cumbersome phone books in all public phone booths (Publifone).

1997: Telecom PTT becomes Swisscom

1998: Liberalisation of the telecommunications market in Switzerland and the EU[29]

[29] http://www.swisscom.com/GHQ/content/Ueber_uns/Geschichte/

2. A Model of the Mobile Telecommunication Market

2.1Introduction to the Model

The market price of a good or service is determined by two basic forces, Supply and Demand. The Supply and Demand Model, originally developed by Alfred Marshall in 1890, is based on Adam Smith's theories published in the book "The Wealth of Nations". Marshall's model is a foundation stone of microeconomic theory and is prominent at business schools around the globe. This simple model attempts to explain the behaviour of consumers and producers in a competitive market environment. In other words, its purpose is to describe and predict the dynamic interaction of price and quantity of goods sold. This model will serve as groundwork for our model.

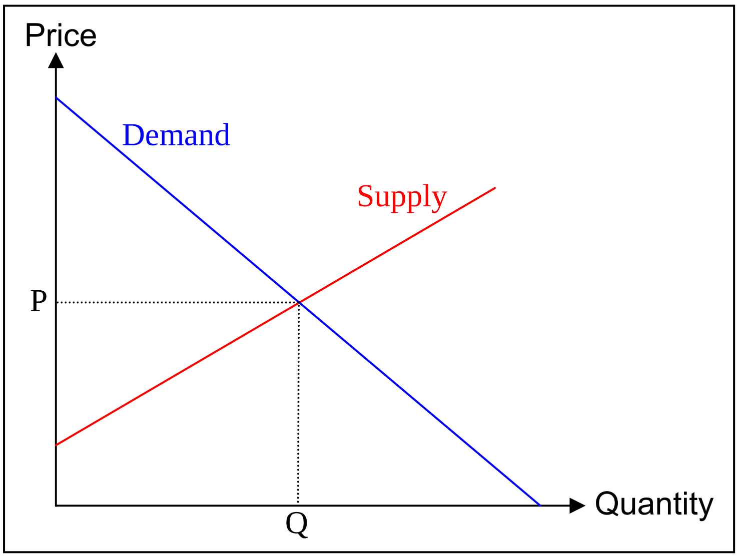


Figure 2.1: Marshall's Supply and Demand Model

The Supply Graph is a function, which describes the quantity of goods and services producers are willing to sell at a given price. As the price increases, more and more producers are willing to produce and sell a specific product. The main determinant of the quantity supplied is the market price, the point where the Demand and Supply graphs cross.

This spot is called market equilibrium. In the equilibrium point, the producers provide exactly the quantity (Q) consumers are willing to buy at market price (P).

As we will see later, the existence of regulatory requirements prevents or at least discourages new operators to join competition in the Swiss Mobile Telecommunication market. A large number of factors have influence on the price level of a product or service; imperfect competition is just one of them.

Mobile telecommunication is the most innovative and dynamic segment of the telecommunication industry. It is also the most profitable.

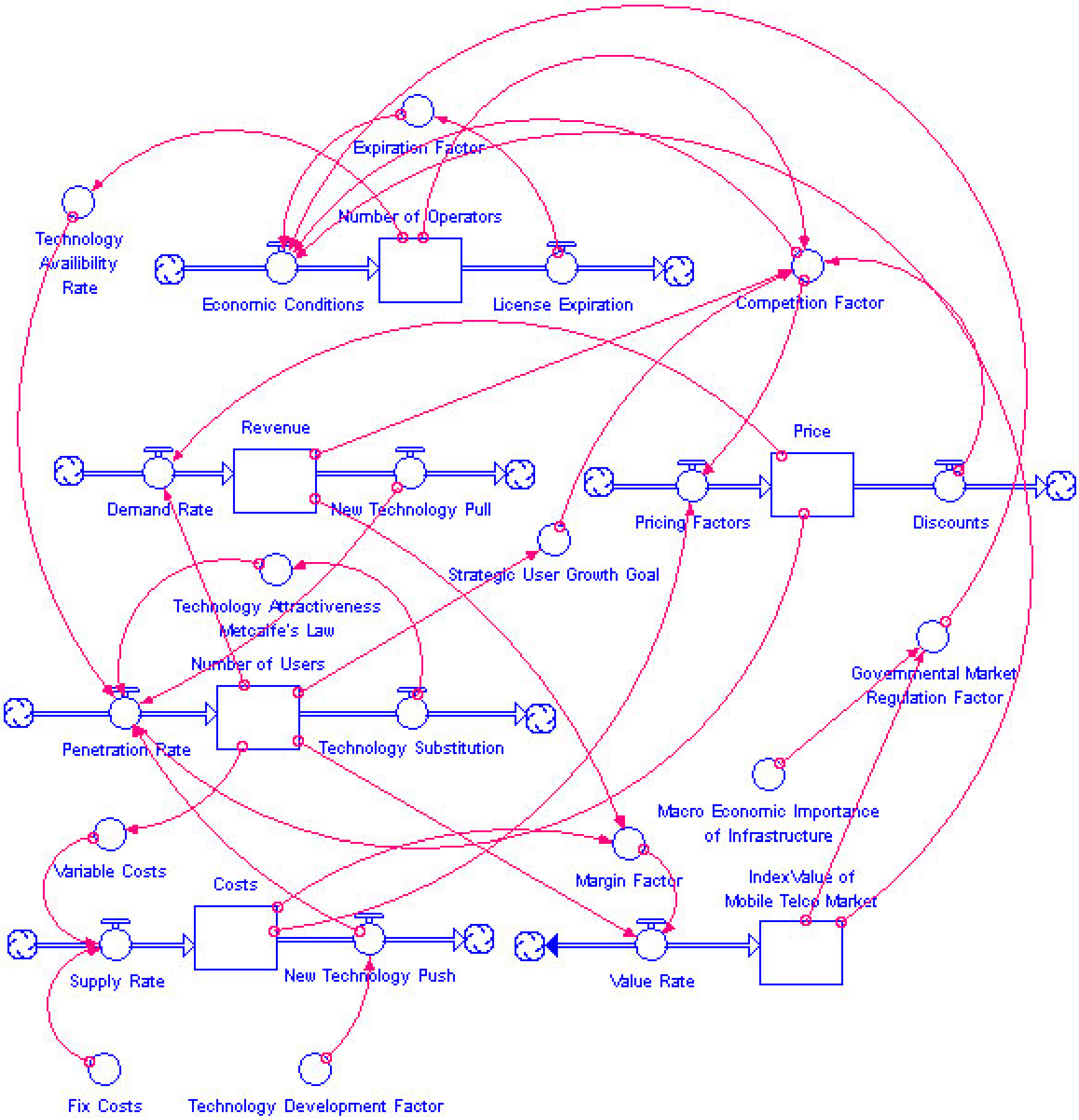
In business as well as in private life, permanent connectivity and accessibility has become central. Mobile service providers experienced impressive growth rates over the last decade, erasing every doubt that modern society will transform into a ubiquity community.

Following is an overview of the model we designed for the business dynamics in the mobile telecommunication market. We will analyze the model in detail, one stock entity at a time. As mentioned in the introduction to this chapter, pricing dynamics play a crucial role in our market model.

A critical aspect in determining the production volume and setting a price for a product or a service is cost. Cost is a pricing factor. In reality, the slope of the Supply curve is not constant. Realistically, the Supply curve is an upward-sloping curve because of diminishing marginal returns due to increasing marginal costs.

Telecommunication service providers such as Swisscom, Sunrise or Orange have costs, just as any other business too. They have to maintain Telecommunication infrastructure, pay wages, finance research, place marketing campaigns in print and television media and of course, pay taxes. Generally, costs can be categorized into two groups – fix and variable costs.

2.2 Market Model



2.3 Costs

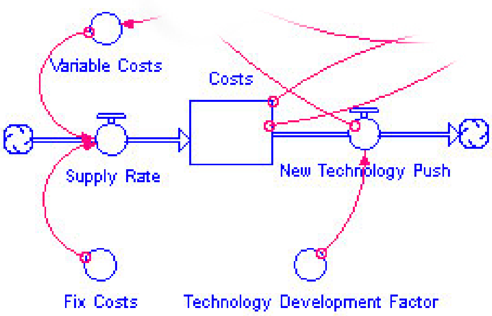


Figure 2.2: Cost-Loop

Fix costs are not influenced by the quantity of goods and services produced. A good example for this type of costs is annual patent payments. Variable costs on the other hand correlate with production volume or the number of customers. This means, as production or usage increases, so do cost.

A single GSM antenna can only handle a certain amount of simultaneous connections. That is the technical reason why Mobile Telecommunication Provider have to install numerous antennas at high frequent public places such as airports and train stations. Maintenance costs of those antennas are linked to the number of customers and antennas; therefore those costs can be classified as variable.

Fixed and variable costs are linked to the supply rate, both with a positive polarization. This mean, as fixed and variable costs increase, the supply factor will go up. The supply rate combines the two cost types and determines the actual costs.

In our model, costs have a positive polarized link to prizing factors. This means when costs go up, so does the prizing factor, resulting in higher prices for the product. Cost also has a negative polarized link to the margin factor indicating that if costs increase, margins will decrease, a stable revenue level assumed.

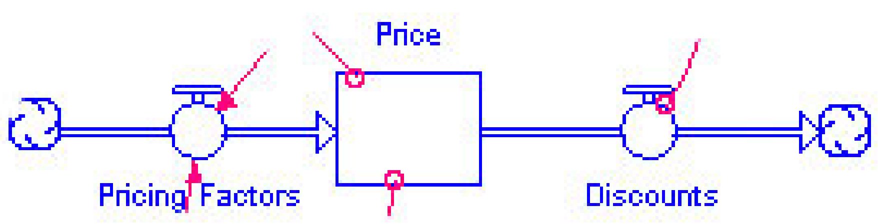
The Technology Development factor describes how fast new technologies can be developed and is a benchmark for the Research & Development Division. The higher the factor, the faster a operator is capable of incorporating new technologies, which then help to reduce costs. New technologies can improve the way; existing products and services are produced/provided. These improvements can increase service quality and lower cost. Or a completely new technology is being tested.

New Technologies can either penetrate a market from the supply side or the demand side. Supply side market penetration, also called Technology push, refers to technologies, which are driven by ideas or capabilities created by companies that look beyond the limitations imposed by current technologies.

They develop new applications and products in the absence of any specific need that customers might have at the present time. Those companies typically invest a lot of money in research and development. They believe that, once the new products are developed, a market demand can be generated. This type of strategy is often based on the fact, that new technologies offer more attractive cost-structures.

UMTS Technology could be classified as a supply side, sunk costs promoted technology. Since all three operators spent millions during the auction for UMTS licences, it is understandable that those companies now try to create profits on UMTS based products. Unfortunately, this technology has to be highly promoted because the demand is lower than expected. Major reasons for this lack of interest are overpriced UMTS content services, worse Network coverage and generally no value added. The most popular features of mobile telecommunication (conversation, SMS Text Messaging, MMS Multimedia Messaging) are even cheaper available on the GSM Network.

2.4 Price



2.3: Price-Loop

As we just showed, costs have a direct positively polarized influence on pricing factors. Competition factor has a negatively polarized link to pricing factors. This means, if the competition factor increases, a service provider has to lower prices in order to maintain competitive.

The competition factor is a complex construct. In our model, the intensity of competition is partially based on the number of competing operators.

The Swiss Mobile Telecommunication Market is an Oligopoly right now, but what happens if more competitors join the market. Normally the competition would increase because each competitor has a strategy how much revenue should be generated and how big the individual market share (user growth goal) should be. In a market where it is very hard do distinct your products over attributes like quality and exclusivity, user growth goals have to be reached by adjusting the price level. A price discount makes a competitor more attractive to customers and some might switch service providers.

In the Swiss market, other competitors typically adjust their prices within a couple of days. The discount price was not a sustainable competitive advantage. This downward price spiral does not only affect the competitors already serving the market, but it also has a direct effect on economic conditions (see Number of Operators).

Let’s have a look at actual mobile telecommunication prices in Switzerland from the year 2000 to 2005.

To simplify the analysis of the Mobile Telecommunication price level in Switzerland, three user categories can be formed: light users (300 national calls and 360 Short Message Service “SMS”-Text Messages annually), average users (900 national calls and 420 SMS annually) and heavy users (1’800 national calls and 504 SMS annually). This is the way operators designed service packages for customers, from light to heavy users where light users usually have lower monthly fixed prices and higher variable prices (price per minute). Heavy user have a high fixed monthly charge but many free minutes included plus cheaper variable costs for every minute spoken after the consumption of all free minutes included in the monthly fee.

The tables below show prices for service packages tailored towards light, average and heavy users.

Table 2.4 :Mobile Costs (Couts des services de telephonie mobile: Comparatif et evolution, BAKOM Federal Office for Communication)

Year	Provider Package	Yearly Cost (CHF)
2000	Sunrise Pronto	452.24
2000	Orange Prepay	490.68
2000	Swisscom Natel Easy	528.64
2001	Sunrise Pronto	379.19
2001	Orange Economy	468.97
2001	Swisscom Natel Budget	472.90
2002	Sunrise Pronto	379.19
2002	Swisscom Natel Budget	472.90
2002	Orange Prepay	490.68
2003	Sunrise Pronto	379.19
2003	Swisscom Natel Budget	472.90
2003	Orange Prepay	490.68
2004	Sunrise Pronto	379.19
2004	Swisscom Natel Budget	472.90
2004	Orange Prepay	490.68
2005	Sunrise Yallo	254.15
2005	Orange Orangeclick	298.67
2005	Swisscom Natel Budget	472.90

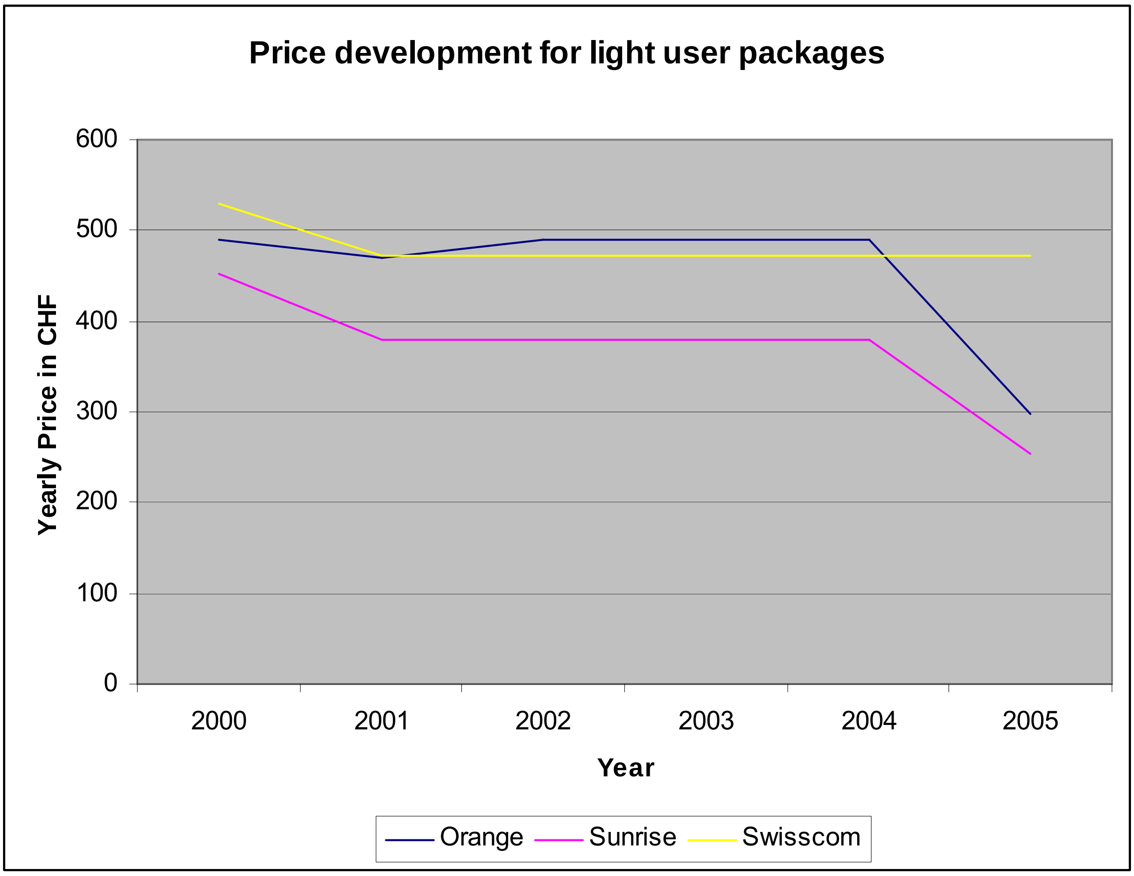
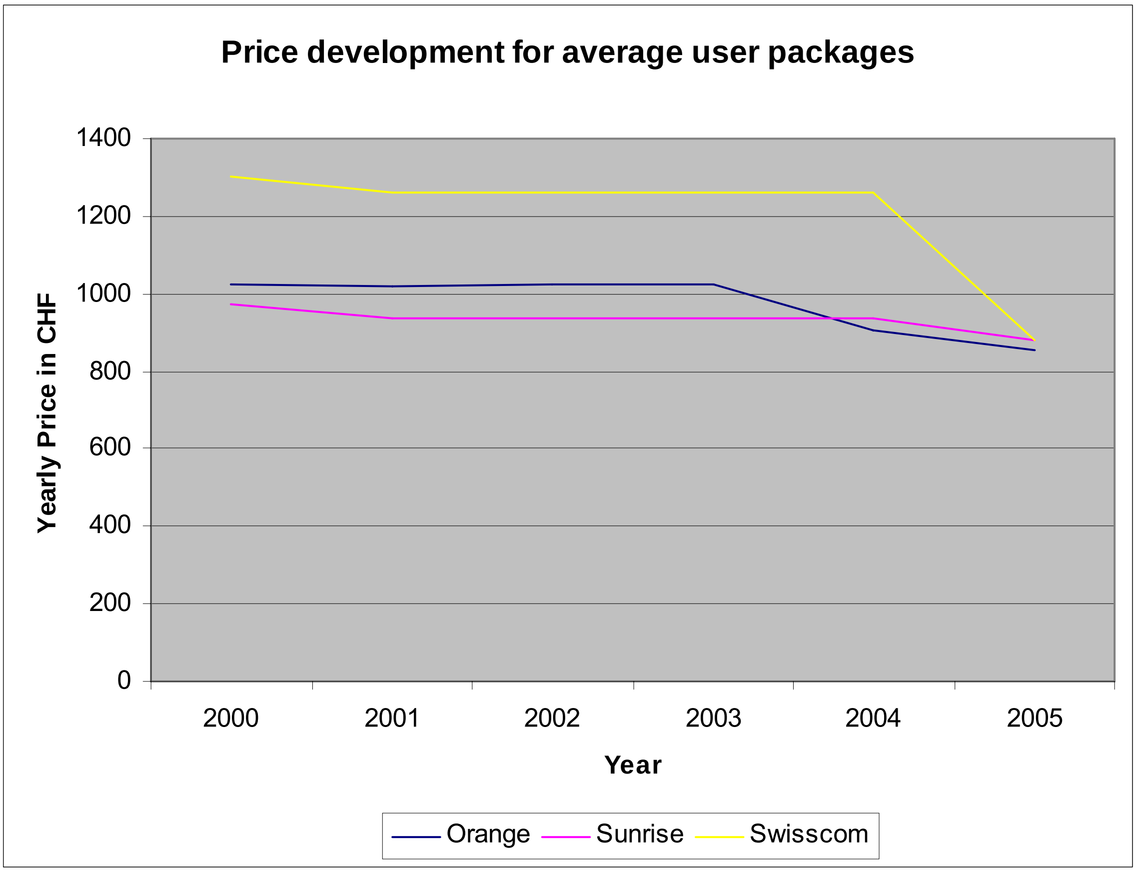


Table 2.5 :Mobile Costs (Couts des services de telephonie mobile: Comparatif et evolution, BAKOM Federal Office for communication)

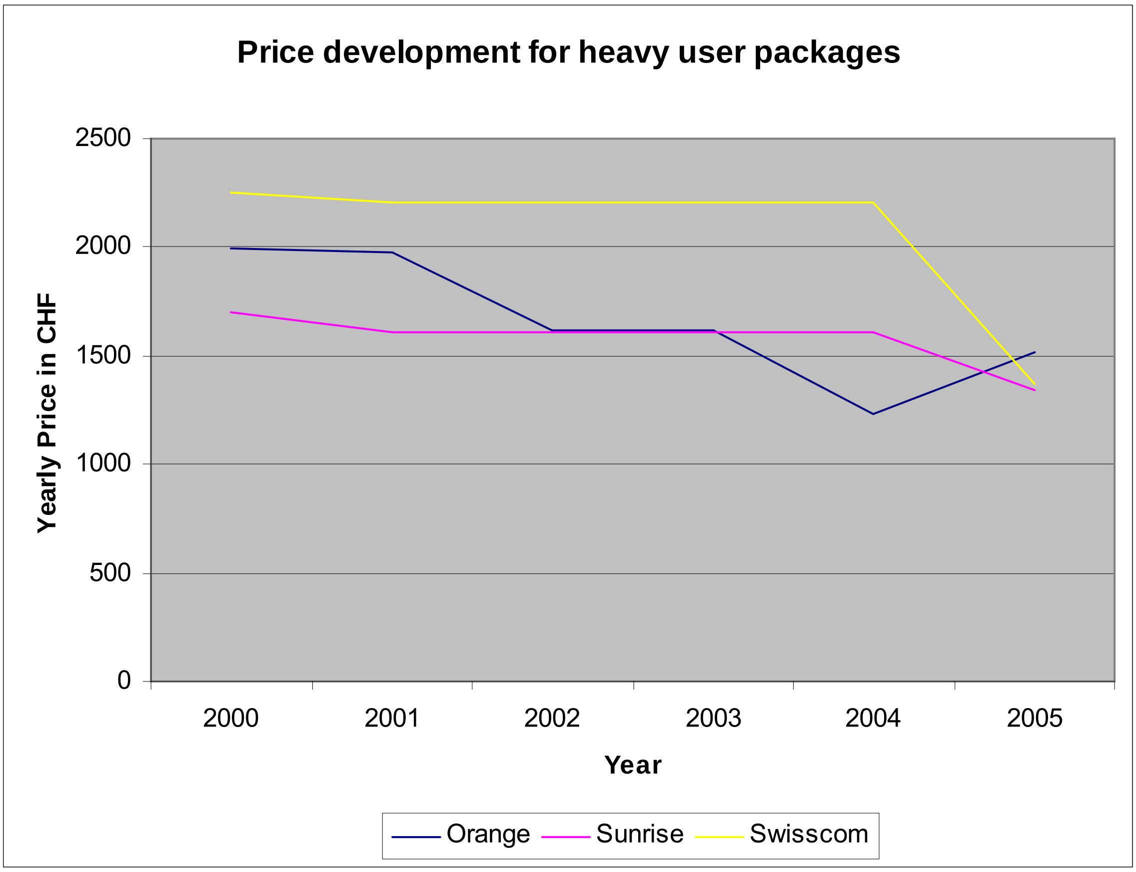
Year	Provider Package	Yearly Cost (CHF)
2000	Sunrise 75	970.48
2000	Orange Plus 100	1025.66
2000	Swisscom Natel Swiss	1301.12
2001	Sunrise 75	936.23
2001	Orange Plus 100	1019.66
2001	Swisscom Natel Swiss	1259.12
2002	Sunrise 75	936.23
2002	Orange Personal Talk 100	1023.67
2002	Swisscom Natel Swiss	1259.12
2003	Sunrise 75	936.23
2003	Orange Personal Talk 100	1023.67
2003	Swisscom Natel Swiss	1259.12
2004	Orange Personal Talk 100	903.67
2004	Sunrise 75	936.23
2004	Swisscom Natel Swiss	1259.12
2005	Orange Optima 100	856.24
2005	Sunrise Liberte	878.88
2005	Swisscom Natel Swiss	882.27



It is interesting to observe that prices for all three user packages were stable during the period from 2001 to 2004. The graph shows that prices are lowered intermittent by operators, which is typical for oligopoly industries.

Table 2.6 :Mobile Costs (Couts des services de telephonie mobile: Comparatif et evolution, BAKOM Federal Office for Communication)

Year	Provider Package	Yearly Cost (CHF)
2000	Sunrise 300	1703.94
2000	Orange Personal	1991.95
2000	Swisscom Natel Internat.	2254.00
2001	Sunrise 300	1607.91
2001	Orange Personal	1977.55
2001	Swisscom Natel Internat.	2203.60
2002	Sunrise 300	1607.91
2002	Orange Advanced	1616.29
2002	Swisscom Natel Internat.	2203.60
2003	Sunrise 300	1607.91
2003	Orange Advanced	1616.29
2003	Swisscom Natel Internat.	2203.60
2004	Orange Exclusive	1230.37
2004	Sunrise 300	1607.91
2004	Swisscom Natel Internat.	2203.60
2005	Sunrise Relax	1338.52
2005	Swisscom Natel Pro	1369.33
2005	Orange Advanced	1514.49



The Swiss Mobile Telecommunication Market can certainly be labelled as an Oligopoly since there are only three competitors.

The three are Swisscom Mobile, a Division of the Swisscom Group, Sunrise, which is part of the Danish TDC Group and Orange, which belongs to France Telecom. Market domination by such a small number of operators resulted in imperfect competition. Because there are only three operators, it is very easy for each on of them, to anticipate the actions and intentions of the other, which makes it simpler to price a product (prizing factor).

In 2005 Swisscom had the biggest market share with 4.3 million users in 2005. Sunrise served 1.3 million customers and Orange 1.2 million.

As prices for consumers of a technology decrease, penetration rate will typically accelerate. The price level is negatively polarized linked to penetration rate. The Global System for Mobile Communications (GSM) technology for example experienced increasing popularity as prices fell and the technology became affordable to the masses. GSM technology, also called 2G technology, achieved enormous market penetration, in some countries, like Sweden, UK and the Netherlands, even a 100%.

When prices go down, not only the penetration rate accelerates but also people increase consumption of that product or service. Prices are negatively polarized linked to demand rate.

2.5 Number of Users

We described how prices affect the penetration rate. Other factors besides the price level influence the penetration rate. Probably the most important factor is the Technology availability rate.

If the technology is not available to consumers, no penetration can happen. The higher the availability rate is (geographically), the better the chances of a fast market penetration.

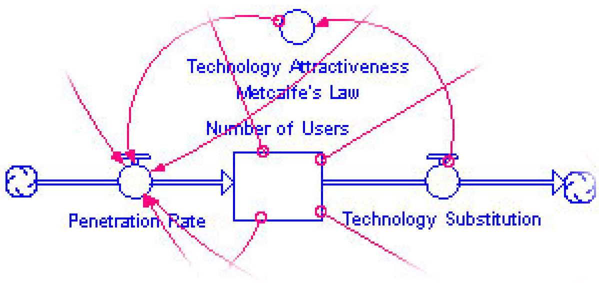


Figure 2.8: User-Loop

The Technology availability rate describes the GSM Network coverage. All three competitors, Swisscom, Orange and Sunrise exhibited a rate of 99% in 2006. This means that the GSM Network geographically reaches 99% of the Swiss population.

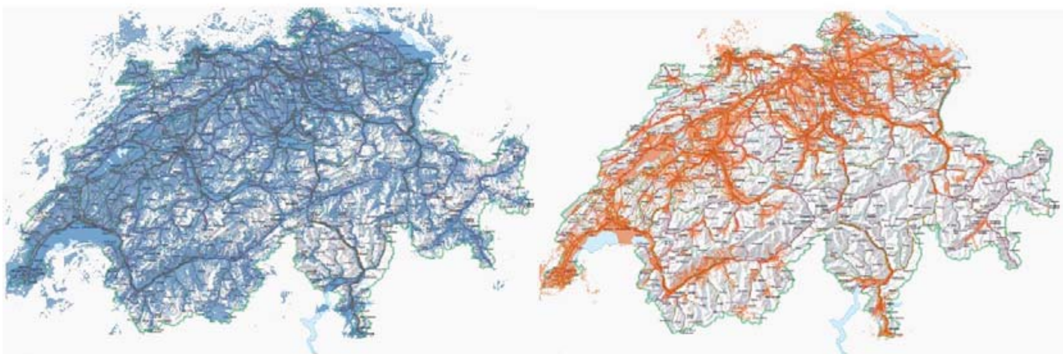


Figure 2.9: Swiss Area Coverage

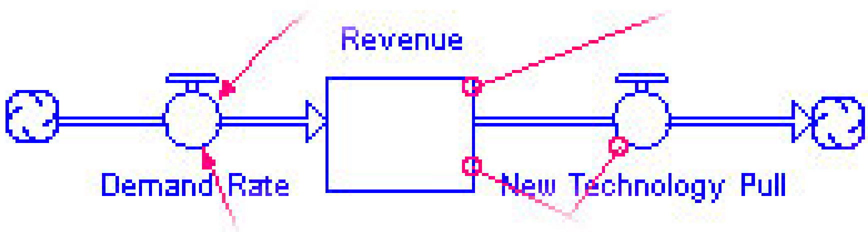
The Swiss map on the left shows the GSM Network covered area (grey). In contrast, the map on the right shows Swisscom's UMTS Network Coverage (grey).[30] The availability rate of the new UMTS technology is still significantly lower than the one of the GSM Technology.

[30] Coverage on April 2006

Communication technologies are only interesting to consumers, if there are other people using this technology. There is no sense in having a fax machine if you are the only person using this technology. This is why the market introduction phase for a net technology is often the most difficult phase in the product life cycle of this product. This phenomenon is known as Metcalf's law. Metcalf said that the value of a network increases exponential to its number of users. As the number of technology user increases, the perceived value to individual potential customer increases. This will result in a re-enforcing positively polarized feedback loop. In reality however, a technology will become obsolete or out dated as the life cycle of this product comes to an end. The lifetime cycle duration of a product is indirectly influenced by other technologies. A new technology can be promoted either from a consumer side (new technology pull) or service providers (new technology push).

We explained earlier, that UMTS is a good example for new technology push. While higher bandwidth capabilities of the UMTS Network did not address a profound customer's need in mobile Telecommunication, accelerated data speed was extremely important to internet users. Digital Subscriber Line or DSL Technology was certainly a demand pulled technology. Demand side market penetration is also often called market pull technology, which is driven by user needs and requirements (demand), rather than by ideas or capabilities created by the service provider.

2.6 Revenues



2.10: Revenue-Loop

The demand rate, as mentioned earlier is a factor that represents the average consumption of mobile telecommunication technology consumers. Based on the price for the product/service and the number of users, the total revenue can be calculated. This figure is important data for business plans and evaluations. Revenue estimation for example can be helpful to make a decision on how much money should be invested for a commission. This was very important when the UMTS commissions were auctioned. The lack of potential or actual revenue information can lead to bad decision making processes.

2.7 Value of the Telecommunication Market

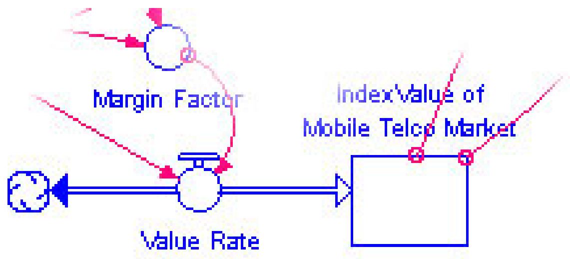


Figure 2.11: Value-Loop

The value of the telecommunication market can be estimated by multiplying the number of user times per capita margin. This value rate has direct impact on the Value Index of the Mobile Telecommunication Market.

The value rate is positively polarized linked to the Value index.

The value of the market is on one hand interesting to new companies which consider joining this market. For them, the Value index is a economic conditions factor. Other factors such as the competition factor have to be considered of course, but generally, the higher the value index of a market, the bigger the chances that more competitors will join the market.

Telecommunication infrastructure has become a very important factor for the economies. Most businesses rely on working telecommunication infrastructure.

The more existential a infrastructure becomes to the well being of a whole economy, the closer the government will watch this specific industry. The governmental market regulation factor is a economic condition factor influenced by the value index of the market and the macro economic importance of a specific industry or infrastructure.

Switzerland has the highest percentage of telecommuting jobs in the world. Experts argue this may be because of the big number of international operating companies headquartered in Switzerland relative to the “small” workforce. Well know companies with headquarters in Switzerland are UBS, Credit Suisse, Nestle, Novartis, Roche, ABB, Swiss RE, Zurich Financial, Adecco, Swatch Group, Ciba and many more.

Telecommunications companies in Switzerland employ about 50,000 people and generate some CHF 26 billion (US$ 20 billion) annually, according to SICTA, an industry association. Besides a strong Telecommunication sector, Switzerland’s IT sector is also highly developed, employing more than 110’000 people, according to the Federal Office for Professional Education and Technology.

The Telecommunication and IT sector is the financially most important part of Switzerland’s economy, besides the pharmaceutical and financial industries. When it comes to participating in the ‘Information Revolution’, Switzerland ranks in International Data Corporations ranking among the top ten nations worldwide, outranking countries such as Ireland, Germany and Japan.[31] As the number of user and macroeconomic dependency on a new technology increases, the government will set up laws to regulate the marketplace. The last time the federal office of Communication had to govern the supply side was on April 13th 2006.

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[31] Information and Communication Technologies in Switzerland, State Secretariat for Economic Affairs seco

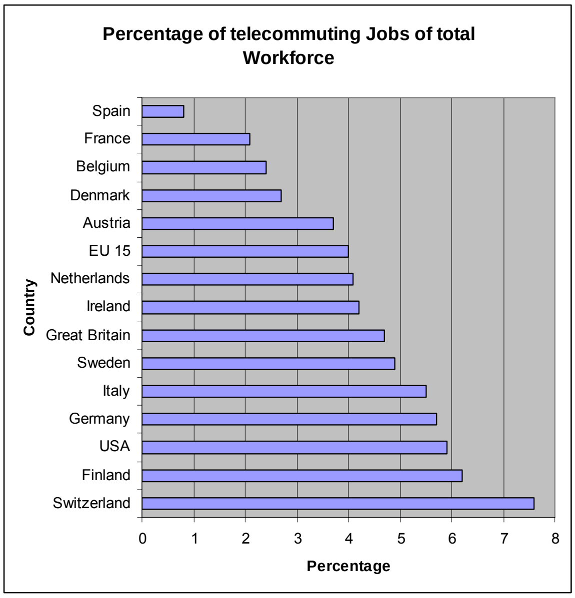
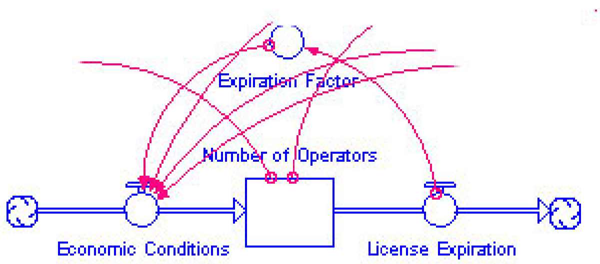


Figure 2.12: Mobile Workforce (SIBIS pocketbook 2002/03, Update August 2003)

The spanish Telecommunication company 3G Mobile (Telefonica) lost its UMTS license because mandatory requirements have not been met. Telefonica failed to invest in the build up of the UMTS Network, accordingly to the rules of the sealed bid UMTS license auction. These sorts of requirements are very common, also in other technologies than UMTS. In the fixed line Telecommunication Network, Swisscom has to provide certain basic services such as public phones; directory and information services, emergency calling, specific services tailored towards handicapped individuals, also analog and ISDN connection have to be accessible throughout the country.

2.8 Number of Operators



2.13: Operators-Loop

In Switzerland, three national service providers are competing for market share (excluding Cablecom). We showed factors which have impact on the economic conditions factor, which rates the attractiveness of a market environment to new, potential companies. Governmental Market regulation is certainly a big barrier for new companies to join the Swiss market because the process of applying and getting a concession is time and money consuming. The Swiss market in on one side very attractive due to high margin levels compared to other European countries, the small size of the market however discourages many potential market entrees.

Regulation offices such as ComCom make sure to enforce governmental regulations. That was the reason some companies, after finally receiving a commission, lost the right to provide services in Switzerland. The mandatory rule, to provide service all over Switzerland distracted those companies who planned just to build up a network in large cities like Zürich or Geneva. License expiration reduces the number of companies who have the right to do business in the Swiss telecommunication market.

3. Discussion

3.1 The Liberalization of the Telecommunication Market

For Swiss customers, the partial liberalization in January 1998 was mostly beneficial. New service providers entered the Swiss market and are now competing for customers against Swisscom, which resulted in lower prices for consumers. Many customers still do not change their service provider. Some may favor Swisscom on an emotional level, because it is a domestic company, other may be just too lazy to do the research and evaluate which provider would best feed their individual needs. Lately, the competitors quickly adjusted their prices to the price reduction of the competition. Typically, a discount price is not sustained over a long period of time which has a negative effect on the customers' decidedness to switch providers. Legal restrictions can further de-motivate customers to switch. According to typical user agreements, only every 12 months the contract can be cancelled. Should a customer miss that deadline, he is stuck with his old provider for another 12 months.

Competitors like Sunrise do only have their own mobile telecommunication network. If a competitor also wants to provide fixed line network communication services, they have to "rent" the lines from Swisscom.

For competitors, it is absolutely crucial to provide, mobile, fixed line and data (Internet) services in order to allocate fixed costs over more customers and products. Also cross selling and bundling services are very important strategies to competitively price their services.

If a competitor "rents" a fixed network line from Swisscom, interconnection costs thereby occur. The interconnection costs have been a point of discussion since 1998, because Swisscom does not make the information public, how much the maintenance of the network really costs.

The issue of interconnection costs is not clearly regulated in the law which resulted in a lot of legal defeats for alternative service providers which sued Swisscom to lower the level of those costs. It is ironic that this law is protecting Swisscom while it was designed ungrudging to promote competition and free market.

It has come to the attention of the Swiss Government and the federal bureau of Telecommunication, that total market liberalization can only be based on a revised legal foundation. When it comes to a revision of this law, the Swiss government has clearly a conflict of interest. On one hand, a well functioning free market is desired but on the other hand many people fear about public telecommunication service. The fact that the Swiss government is still the biggest shareholder of Swisscom and receiving millions in dividends each year is another fact which slows down the legal process of changing the law.

The unbundling of the last mile is a planned topic of discussion for the summer session when all parties will meet to discuss this issue.

Figure 3.1: National Assembly Hall, Berne

But it is not a given fact that unbundling the last mile will result in a price reduction for the customers. A crucial factor is competition, which will hopefully increase as new service providers will start operations in Switzerland.

Such competition would also promote further investment in research and new technologies.

3.2 Telecommunication Administration Agencies

The BAKOM (Federal Agency for Communication) was established by the UVEK (Department for Environment, Transportation, Energy and Communication) in 1992. The BAKOM is a regulatory agency supervising the Swiss telecommunication and media industry. Because of the 60% equity majority of the Swiss government in Swisscom, many people questioned the independence of the BAKOM. For this reason, the ComCom (Federal Communication Commission) was founded in 1997 as neutral, independent concession and regulatory agency. The ComCom consist of seven members which are elected by the federal council of Switzerland.

3.3 Interconnection

The process from the PTT monopoly to a totally unbundled telecommunication market is slow and tricky. To build an own network only makes sense in mobile telecommunication because fixed lines are more expensive to install and operate. It does not make much economical sense to have more than one fixed line network installed. That is why Swisscom is legally obligated to provide interconnection services to competitors. Swisscom has to negotiate the prices with each individual competitor. Are the two parties unable to reach an agreement within three months, the ComCom will establish interconnection conditions and prices.

3.4 ComCom

TDC Switzerland AG (Sunrise) was the first company to place a complaint at ComCom in April 1998.

Sunrise wanted Swisscom to lower its interconnection prices. ComCom reviewed the data and then asked Swisscom to lower prices between 4 to 25%, depending on the service. This was only a partial victory for Sunrise since they asked for a bigger discount. Sunrise also requested the right to have insight into Swisscom files which show the effective costs Swisscom has to maintain the telecommunication infrastructure. Swisscom refused the access to those files and declared them confidential.

In January 1999, the two parties finally found an agreement. This disagreement was solved relatively easy but everybody involved realized the shortcomings of the procedure to determine the interconnection price level. Should one party ask for a much bigger discount and be more bullheaded about its request, a legal battle could start which lasts for years. This situation was very discouraging for competitors who planned to enter into the Swiss market because they had no reliable data how to set prices for their services and financial planning.

3.5 A New Procedure to Determine the Interconnection Prices

A fundamental improvement came in January 2000 when new rules to interconnection price setting were established. The LRIC (Long Run Incremental Cost) act does prohibit Swisscom to charge its competition for its own financial relicts (infrastructure installation costs). The interconnection prices have to be based on the actual costs generated by interconnection services provided by Swisscom. Additionally, Swisscom is granted an averaged (telecommunication industry average) yield return on its investments which are to be included in the interconnection prices. ComCom received many complaints because competitors had the opinion that Swisscom is interpreting the LRIC Act to its own advantage.

3.6 Competition from Cablecom

Cablecom is the biggest TV cable network owner in Switzerland. Cablecom was bought by the US Company Liberty Global Inc in 2005. The new management soon realized the potential of Cablecom's infrastructure and began to focus on telecommunication and data services instead of just broadcasting TV channels.

Since February 2003, it is possible to phone over the TV cable network. This technology enables Cablecom to bypass Swisscom's last mile. Cablecom became a leading provider for telephone, cable TV and broadband internet.

Swisscom answered the threat by attacking Cablecom in the TV market segment. Swisscom joined with Microsoft and started Bluewin TV, the first national TV Service over the fixed line network.

Other technologies are tested by competitors to bypass Swisscom's last mile. Wireless local loop (WLL) is a technology based on radio which makes the last mile obsolete. This technology is capable of sending a fixed radio signal over 35km (22 miles) delivering telephone calls and internet data connections to households within reach.

Ascom, a Swiss electrical energy provider is testing Ascom Powerline Communications which carries data (telephone and internet) over the electrical network.

The WLL and Powerline technology may sound promising but are no real threat to Swisscom because both are still in a testing phase which probably will last for at least two more years.

3.7 Unbundling in the European Union (EU)

The EU asked its members to provide an unbundled telecommunication network by the end of 2000. This was an enormous request because countries like Germany, France, Sweden and the United Kingdom all faced problems similar to Switzerland.

Germany was the first country to meet the request by January 1998. In March 2000, the last mile was opened in Sweden and in April the United Kingdom followed. In September 2000 France successfully unbundled the last mile.

All these countries experienced increased competition which produced better quality and cheaper products and services.

Swisscom often predicts a quality drop in case of a total unbundling of the last mile, but quality remained the same in Germany, Sweden, France and the UK.

3.8 The New Televisor Law

The purpose of the new televisor law is to strengthen the telecommunication market in Switzerland and revitalize competition. The strategic goal is to liberate the last mile and give all carriers direct access to households.

The Televisor law will be completely revised but efforts are focused on the issues that are relevant to consumers and competition in general.

A very important change is the fact, that new telecommunication service providers which plan to do business in the Swiss market no longer need a concession. New competitors will simply register at BAKOM. All competitors still have to provide their services nationally and not just to the more lucrative city areas.

This will secure public service in remote and sparsely populated regions of Switzerland.

So far, the telecommunication sector worked without financial help from the government. Swisscom financed all infrastructure investments. The new law will distribute the costs fairly over all service providers.

The political and legal procedures are working. It is only a question of time till Swisscom will lose its last mile monopoly. Critics however are convinced that prices will not fall very much since maintenance costs will still be the same.

Big international Swiss companies will be the biggest winners of the liberalization. Increased competition will empower high volume customers. Service providers will agree to big discounts in order to keep key clients. Insiders estimate that key clients spend up to 5% of their revenues on telecommunication services.

Swisscom faces a dark future. Should more service providers decide to enter the Swiss market, Swisscom's revenues will probably decrease so will margins. A strategy of Swisscom is to acquire other companies outside Switzerland in markets with big growth potential. Swisscom planned to start broadband Internet services in Eastern Europe. The diffusion rate of broadband internet is below 10% in most Eastern European countries.

Unfortunately, Swisscom's foreign growth strategy conflicted with the strategy of the Swiss Government. This is no surprise due to the unsuccessful acquisitions Swisscom made earlier. The Swiss government asked the management of Swisscom to either pay higher dividends or invest and create jobs in Switzerland.

3.9 Conclusion

Swiss consumers pay to much for telecommunication services compared to other European countries and purchasing power adjusted. Our model focused on the mobile telecommunication market, because this market is theoretically the most competitive segment of the Swiss telecommunication market. The market dynamics in the fixed line network used for telephony and internet services do not work properly because of the high interconnection costs Swisscom charges. Competition is falsified.

Telecommunication market consolidation can be found in many European countries, especially Germany and France. One might wonder why the Swiss telecommunication market is not consolidating. Our model identified various reasons responsible for the stability of the Swiss market.

First of all, the Swiss telecommunication market is very small and might be below the critical size for many international companies. Margins may be higher in the Swiss market but the small number of consumers is limiting the revenue potential. A market has to have significant over capacities in order to experience consolidation. The Swiss market is shared by only three companies and therefore very stable. The small number of competitors led to a oligopoly with very stable prices. The "old" Televisor law is to a certain amount responsible for the lack of more competing companies. This law protected the interest of Swisscom and was a big administrative and legal barrier for companies who planned to join the Swiss market.

All three national service providers, Swisscom, Sunrise and Orange are very big companies (market capitalization) with huge financial resources. The examples France and Germany showed that typically small companies with liquidity problems are acquired by bigger competitors with more financial stamina. Financial weakness (liquidity) and relative size (market capitalization) are very important factors for acquisitions.

Switzerland is shortly before passing the new televisor law and the liberalization of the last mile. This law will not only have an impact on fixed line telecommunication but on mobile telecommunication as well. New companies will only have to register and not go through the long and complex process of receiving a concession.

The Swiss market will become more attractive for new companies because the fixed lines market will also become interesting and not just the mobile market. In other words, fixed line market liberalization also promotes competition in the mobile segment of the telecommunication market.

New companies will hopefully be attracted and make the Swiss telecommunication market more competitive, independent and transparent.

Prices in all service categories fixed lines, mobile and data can be lowered and adjusted to the European price level. Market analysts and the management of Swisscom however predict prices to remain stable.

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