INTESP

A framework for developing successful business strategies for Internet Service Providers

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Contents

List of Figures

List of Tables

1 Introduction

The fast proliferation of services over the Internet and the development of new Internet standards and technologies are affecting the existing business models of the traditional telecommunications market. This holds in particular for the ISP market. With a further maturing ISP market – including professionalisation and competition - a differentiation of the delivered service portfolio, among others in terms of quality of service, will be required in order to meet different (business) customer preferences.

1.1 Objective of the research

The main objective of this project is to gain insight in the evolving market structure of Internet Service Providers. For this, we need to capture the basic elements of the business strategies of different types of Internet Service Providers (ISPs) and to assess their impacts on the competitive position in the market. A firm with a strong competitive position in an attractive market (that is, it adopts a successful business model) has a good opportunity to make a profit.
The main questions we address in this report are:

1. What are the most important elements of the ISP business strategies?
2. What is the impact of these elements on the competitive position of different ISPs?
3. What are the impacts of developments in Internet technology, of increasing competition, and of changes in regulation?
4. What are the strengths and weaknesses of various types of ISPs, and what are their opportunities and threats?

To be able to answer these questions we first have to do some work to obtain the necessary information. This work consists of a characterisation of various types of ISPs (internal analysis) and a description of the ISP industry and market forces (external analysis).

The market structure describes the competitive position of all ISPs. This requires that we know the demand and supply function and thus the factors *determining* demand and supply (that is, the driving forces of demand and supply). Demand is determined by the Willingness (of customers) to Pay for specific services. Since not all customers have the same preferences, we make a distinction between different types of customers in terms of market segments that have different preferences and demand different services.
Supply is determined by the cost function of providing a service; therefore we need information on the cost elements and cost drivers of providing various services.
The market structure is not only determined by the interaction of demand and supply, but also by external developments, such as technology and regulation. Thus, we also need information on these aspects.
Based on this information we can analyse possible business strategies for ISPs. The central question is: what business strategy will be a successful strategy for a specific type of ISP? To answer this question we develop a (qualitative) model of the market

structure of ISPs and assess the impact of various business strategies on different types of ISPs.

1.2 Structure of the paper

The paper is structured as follows. A short overview of developments affecting the ISP industry is presented in section 2. Section 3 presents a framework for analysing ISP competitiveness. Starting point is the ISP value chain of economic activities underlying IP-based service provision. The framework takes into account other dimensions of competitiveness such as factor inputs, product portfolio, pricing and market segmentation. Section 4 focuses on how choices concerning these dimensions affect cost advantages and opportunities for service differentiation. The analysis proceeds in section 5 with applying the framework to real life ISPs, and thus finds the strengths, weaknesses, opportunities and threats for these ISPs. Further, this section elaborates on the construction of ISP industry scenarios. Finally, section 6 concludes with some final remarks.

Disclaimer

We acknowledge that there may be many features of business strategies of ISPs that are relevant for the competitive position of an ISP. In this report we analysed the impact on the competitive position of a *selection* of these features. Therefore we do not claim to be exhaustive. Furthermore, our model-based analysis is mostly *qualitative*. For a quantitative analysis the model should be extended and we should have reliable data available.

2 Developments in the ISP market

The ISP industry currently faces a number of issues that can have a great influence on its market and strategy development.

2.1 Internet technology and services

Internet is a worldwide network of networks that all use the same communication protocol, TCP/IP, so that the various networks can communicate with each other. The Internet has a lot in common with telephony networks, but there also are a number of differences[1]. One important difference is that telephony services are circuit-switched (which requires an end-to-end circuit before the call begins) whereas Internet provides packet-switched services. Of course, the state of the technology puts restrictions on the possible services and the quality of those services.

Internet2 (www.internet2.edu) is taking a big leap forward with the launch in the U.S. of a high-speed, coast-to-coast network, known as Abilene (see http://www.ucaid.edu/abilene/). This will be an important testbed for developing new Internet services and applications. One important goal of Internet2 is to improve the current best-effort service by developing a way to implement Classes of Service (differentiated services).

Quality of Service (QoS) is becoming a crucial factor in ISP competition. QoS requirements currently are driven by the development of real-time applications such as IP telephony (VoIP) and Video over IP (VIP). Especially important in realising QoS are technologies regarding the next generation Internet. Examples are protocols such as IPv4/IPv6 (transport of data independent of the underlying network[2]) and RSVP (Resource Reservation Protocol, enabling applications to signal per-flow requirements to the network). Two broad developments are visible which are partly complementary:

- INTserv (integrated services) technology offers end-to-end QoS per dataflow. It is based on reservation of resources through the network (RSVP, resource reservation protocol). A disadvantage is its low level of scalability.
- DIFFserv (differentiated services) technology supports capacity division in different pipes each with a different capacity. DIFFserv thus does not offer guarantees of reservation per stream, but is based on end-to-end prioritisation per hop (Classes of Service).

1 See Tanenbaum (1997) for information on computer networks.

2 IPv6 offers broad address space, encryption, QoS, and is in the process of standardisation. The current IPv4 protocol offers a more limited number of addresses (possible solutions are Classless Interdomain Routing and Port Address Translation), offers QoS and security, and is standardised except for QoS; however, via the TOS-field IPv4 is capable of differentiating between various qualities.

For the application of the differentiated services concept (see IETF web sites[3]) further development of accounting and billing systems is necessary. Accounting architectures are currently being developed that support management of Internet resources. These architectures also manage pricing and accounting of different classes of services and service levels. Middleware technologies such as enhanced IP-multicast facilitate a new range of communication applications. Relevant issues are technical as well as strategic.

Examples of technical issues are: what kind of accounting architectures should be developed for the next generation of Internet, and what type of middleware components are necessary. Strategic issues include the evolution of the Internet service portfolio, the influence of technologies and architectures on the opportunities for existing players and new entrants, the strategic importance of technologies and the development of alliances.

2.2 Internet Business innovation

As a result of technology development, new business strategies will evolve in supplying infrastructure capabilities as well as in provisioning differentiated qualities of service. This is already becoming apparent in innovative players that for example combine fibre optic networks and Internet technology. They build networks that provide new services such as video voice mail, video conferencing, or differentiated quality of service. Electronic commerce services also may provide new opportunities for Internet service providers. New business models arise providing differentiated pricing structures and methods of (re)packaging and (un)bundling[4]. A pre-condition is the development of billing and accounting systems. Relevant strategic issues concern the positioning of existing and new players in the ISP market and the identification of new service segments.

2.3 Regulatory and policy issues

Interconnection agreements and traffic exchange are important regulatory issues. Internet traffic exchange requires agreements between the different parties involved, on an international scale. Current exchange patterns are being criticised for not being transparent or non-discriminatory and for not providing sufficient compensation for the costs of some of the parties involved. Insight is needed in how Internet traffic will develop under given interconnection agreements (peering, transit), what the international and cross-supply chain interdependencies are, how these dependencies affect quality of service and finally how it affects strategic innovations and market developments such as electronic commerce. Strategic decisions of service providers concerning infrastructure, location of electronic commerce activities and innovation will be affected strongly by these developments.[5]

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3 Internet Engineering Task Force: http://www.ietf.org/html.charters/diffserv-charter.html

4 See Shapiro & Varian (1998).

5 See OECD, *'Internet Traffic Exchange: Developments and Policy'* (1998), "The private sector, and in particular ISPs, are actively developing infrastructure to 'localise' Internet traffic flows by improving the performance of local infrastructure. Their initiatives include the establishment of an increasing number of Internet exchange points and greater global distribution of the infrastructure supporting the DNS.

2.4 Market structure and market developments[6]

The landscape of providers of Internet services is rapidly changing due to the interplay between technology, business and regulatory and policy factors. This section gives an overview of some (forecasted) market developments.

A first look towards the *supply* side of the ISP market shows that the number of ISPs is expected to be at its top this year (See Figure 1). This is the net result of two opposing trends in the ISP market, namely[7]:

(1) merging and consolidation, led by the giant cable and telecommunications companies which have the infrastructure and financial resources to swallow up smaller ISP firms; further, less competitive players get weeded out; and
(2) the emergence of ISPs dedicated to a specific industry, nation, region or user group.

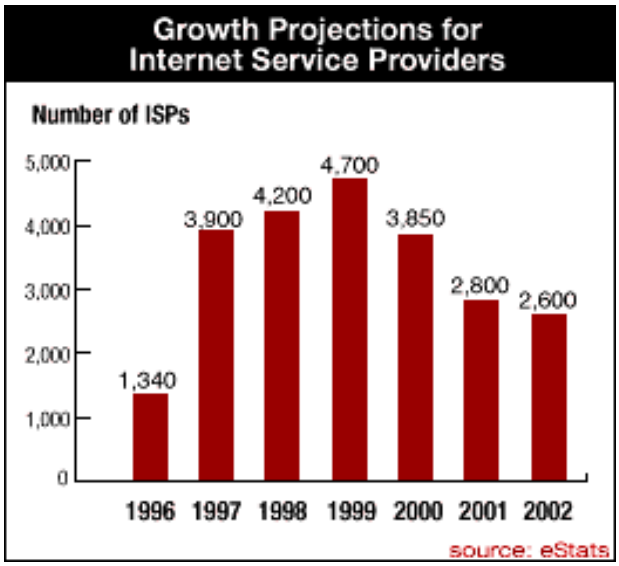

Figure 1: Number of Internet Service Providers

Examples of mergers, acquisitions, joint ventures are: WorldCom and MCI, AT&T (phone) and Time Warner (cable); America Online (ISP) and Netscape (web browser); Microsoft (software) and BT (phone); Cisco and Motorola; BT buys Arrakis (Spanish ISP); KPN (phone) buys Xs4All (Dutch ISP); Cable & Wireless buys ECRS Network Service (German ISP); @Home mergers with Excite; bART (Dutch ISP) is taken over by Via Networks, KPN and Qwest; and many more.[8]

'Localisation' indicates the fact that content, services and some network functions are being shifted closer to the user to increase network efficiency (e.g. faster response times). These developments are critical in improving the performance of the Internet for electronic commerce".

6 European Commision study carried out by: Databank Consulting, IDATE, TNO*: 'Evolution of the Internet and the WWW in Europe'* (1997).

7 Partly based on data obtained from http://www.emarketer.com/estats/nmsg_isps.htm

8 See http://www.com-broker.com/ for information on ISP mergers and acquisitions.

Web advertising

There are three important sources of revenues for ISPs, namely
(1) subscription fees
(2) advertisement revenues
(3) part of the telephone charges (in Europe)
Given the growth in the number of Internet users, the revenues from subscription fees will largely increase (dependent on the developments in pricing of Internet usage). The estimations of spending on advertisements in 1997 on the web vary from 400.10^6 to 940.10^6 (seeFigure 2).

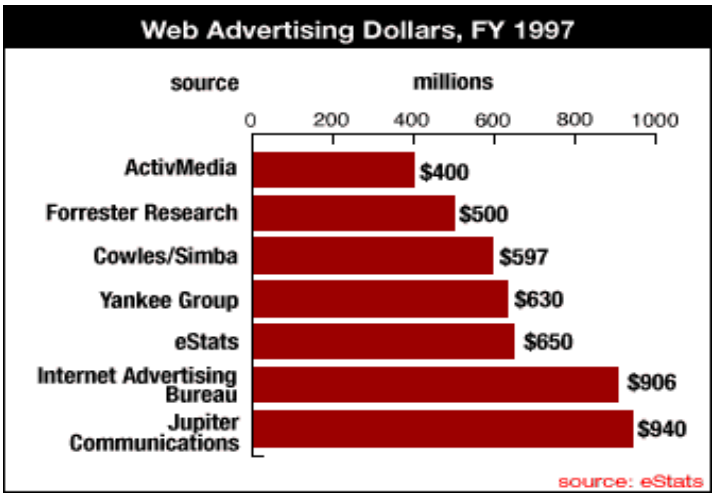

Figure 2: Web advertising dollars (source: eStats)

EStats places annual web ad spending at $175 million for 1996, and $650 million for 1997[9]. Their forecast for advertisement spending on the web is shown in Figure 3.

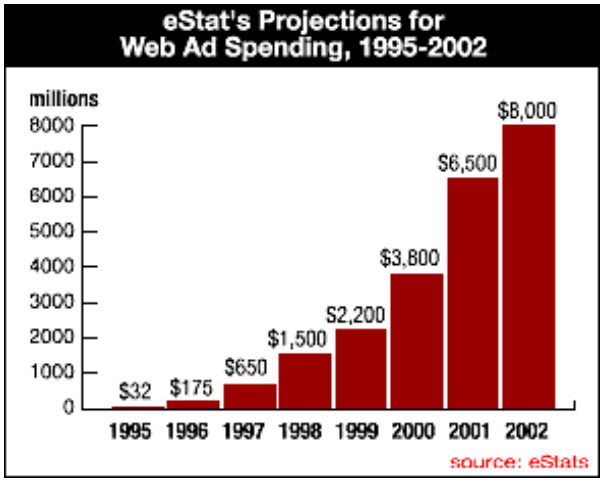

Figure 3: Projection of web ad spending (source: eStats)

9 Source: http://www.emarketer.com/estats/ad_rev_today.html

EStats projects U.S. web ad spending will grow from $650 million by year end 1997 to $3.8 billion in the year 2000 (average annual growth is 80% in 3 year), and $8.0 billion by 2002; this is an average annual growth of 65% in 5 year.[10]

Internet in the Netherlands

The percentage of Dutch organisations with Internet connection has increased in 1½ year from almost 20% in June 1997 to 37% in December 1998. Furthermore, another 21% of the organisations are planning an Internet connection within one year. In the same period, also the number of households with Internet connection doubled to about 1 million households (± 16%). The value of products and services bought via Internet is about 1000 million per year. The number of buyers via Internet is currently increasing by about 100% per year.[11]

In the Netherlands there are approximately 150 ISPs (access, content and backbone providers) with total sales of 545 million guilders; figures from 1996. Of this total number 42% are access providers, 50% is content provider and 8% is backbone provider (based on Jonkheer 1997).

ISPs in the Netherlands providing services nation-wide (with url www.aa.bb between brackets)

1. Axxel New Technology (axxelnt.nl)
2. Avades (avades.nl)
3. bART (bart.nl)
4. BetuweNet (betuwe.net)
5. Business Internet Trends (bit.nl)
6. Cistron Internet Services (cistron.nl)
7. CyberComm BV (cybercomm.nl)
8. Demon Internet (demon.nl)
9. EuroNet Internet (euro.net)
10. HobbyNet (hobby.nl)
11. Horizon Internet Services (horizon.nl)
12. Internet Access Eindhoven (IAE.nl)
13. Internet Access Foundation (iaf.nl)
14. Internet Direkt (direkt.nl)
15. InterNet Noord (InterNet Noord.nl)
16. Kabelfoon (kabelfoon.nl)
17. Limit Internet Services (limit.nl)
18. MediaPort Rotterdam (mediaport.org)
19. MultiWeb (multiweb.nl)
20. NederNet (nedernet.nl)
21. PLANT ACCESS (plant.nl)
22. Solcon (solcon.net)
23. Support Net (support.nl)
24. The Internet Plaza (tip.nl)
25. TrefPunt (tref.nl)
26. UUNET (inter.uunet.nl)
27. WebConnect Internet BV (WebConnect.nl)
28. Wirehub! Internet (wirehub.net)
29. WISH (wish.net)
30. World Access/Planet Internet (wxs.nl)
31. World Online (worldonline.nl)
32. XS4ALL (xs4all.nl)
33. ZeelandNet (zeelandnet.nl)

There are several tens of small regional ISPs in the Netherlands (see for a ranking of ISPs: http://www.providertest.vuurwerk.nl/results/index.html).

[10] Source: http://www.emarketer.com/estats/ad_rev_forecast.html

[11] Sources: www.nipo.nl and AutomatiseringGids, April 2nd 1999.

Internet services for free ?!

There are several ISPs/organisations who offer certain services for free. Examples of these organisations are:

- Net Zero (http://www.netzero.net/). Net Zero offers free Internet access and e-mail.
- Hotmail (http://www.hotmail.com/). Hotmail is the earliest organisation providing free e-mail. In 1998 Microsoft acquired Hotmail for about $350 million; Hotmail has never made profits yet.
- Webjump (http://www.webjump.com/); Webjump provides free web hosting facilities.
- Connectfree (http://www.connectfree.co.uk) are located in the United Kingdom; they started August 1998. Customers only pay the costs of local calls
- Free-pc (http://www.free-pc.com/); giving away ten thousands of PCs;
- Freenet (http://www.freenet.net/); Freenet provides free Internet access and e-mail facilities.
- Freeserve (http://www.freeserve.net/) Freeserve is owned by Dixons Stores Group
- and many more….

The question that arises is: what is the business model of these organisations? And will they be successful? Should other ISPs follow this strategy? The business model of an organisation offering free Internet services is often based on revenues from web ads[12] and a percentage of the telephone costs (not only for the time being on line but also especially for tech support). Furthermore, owners of these organisations may offer free services to attract customers to their core business (this could be the case for Dixons)[13].

Looking at the *demand* side of the ISP market, the number of users of Internet is increasing sharply. In 1996 there were worldwide 19 million Internet users; this number has grown to 36 million in 1997, an increase of 90%. In 1997, about two-third of the total number of users were inhabitants from the U.S. The expected growth of the number of users is depicted in Figure 4. Worldwide the growth is expected to be approximately 30% per year to 142 million users in 2002. In the U.S. the annual growth is expected to be a little over 20% per year until 2002. Therefore the number of users *outside* the US, will grow by about 45% annually until 2002.

12 The succes of these business models is unclear. NetZero still exists; however, several subscription-free ISPs already have closed down.

13 See for a comparison of 'free' ISPs: "Which free ISP?" in the April issue of the magazine ".net". The author ends with "you get what you pay for"….

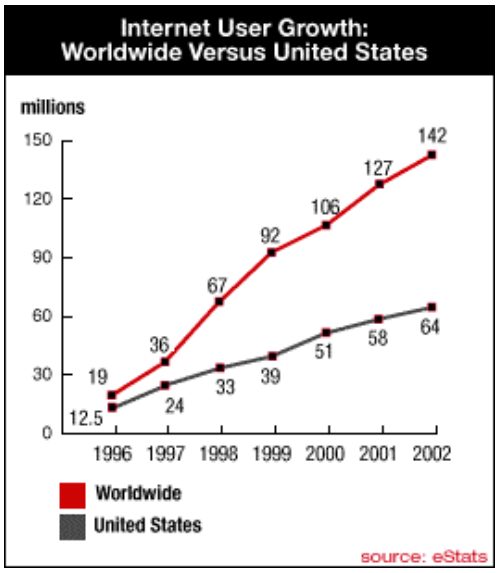

Figure 4: Internet user growth

Combining the above stated two developments regarding the market supply side (number of ISPs) and market demand side (number of users) implies that on average it is expected that ISPs in 2002 will have 6 times as much subscribers as in 1997. The ISP market structure will be determined to a large extent by the success of new market strategies such as web advertisement and offering 'free' Internet services.

2.5 Focus of this research

Given the stated developments and expectations of market researchers, the following questions arise with respect to the evolving ISP market structure and how it affects ISP strategies:

> *How does the business strategy of Internet Service Providers determine the competitive position in the ISP market? Which ISPs will obtain a strong competitive position as the ISP market matures? What is the business model of successful ISPs?*

In the next section a conceptual framework will be proposed and subsequently be applied to the process of strategy development of ISPs.

3 A framework for analysing ISP competitiveness

3.1 Types of ISPs

For our analysis a classification of ISPs is necessary. A simple classification of ISPs is obtained by making a distinction in wholesale ISPs and retail ISPs. Wholesale ISPs exploit the backbone infrastructure and provide interconnection to other networks; further, they sell transmission capacity to retail ISPs. The retail ISP sells Internet access to end-users. In reality, the situation however is blurred: MCI/Worldcom not only sells backbone capacity to other ISPs, but they also have large business customers; indeed, they are entering the market for residential customers (again).

The provision of Internet services goes along with various features. Neither all ISPs fulfil all activities of the functional value chain nor do they provide all Internet services. Because of these differences we can distinguish different types of ISPs. To analyse competitive strategies of different players in the Internet market it is useful to distinguish them by characteristics that already existed before they entered the Internet business. Therefore we choose an institutional classification. In such an institutional view the following types of ISPs are distinguished (see Table 1)[14].

Even though all incumbent telcos are allocated to the same type of ISP, they are not necessarily equivalent in all respects. This holds true also for the other eleven types of ISPs. Allocating real existing ISP to a specific classification always goes along with a simplification. Nevertheless, to be able to derive general results we need to simplify. We focus on those characteristics that are of relevance for the provision of Internet services.

14 How many types of ISPs exist in the institutional view can only be stated for a given moment. It depends on the different backgrounds of the players that are offering Internet services. Because we do not know all backgrounds of all ISPs we can't present a complete listing of types of ISPs. However, we identified the most relevant type of players.

Type of ISP	Description	Examples
Small regional IAP	This type only offers access to users in a small region	'DDS' (de digitale stad) and 'Interstroom' in the Netherlands or 'IVM' in Germany
Dedicated nation-wide ISPs	wholesaler, full service provider	'xs4all' (NL, now full subsidiary of KPN) or Nacamar (GER)
Incumbent telecom operators	Fully integrated telecom operator that is also offering Internet services on the retail market	KPN with Worldaccess/PI and Deutsche Telekom AG with T-online
New telcos (entrants into liberalised telecom market)	Telcos with little infrastructure but right to interconnect	Mobilcom or Teldafax in Germany
Content providers	suppliers of content that use the Internet as an alternative distribution channel	the most popular is AOL, also well known is CompuServe (a subsidiary of AOL)
New carriers (backbone capacity suppliers)	Recently founded carrier with huge international network capacity; wholesale market and business customers	Qwest, Worldcom/MCI and Level3
Equipment provider	hard- or software supplier that offer Internet services to business customers	IBM, Microsoft, Motorola, Ericsson
Cable companies	use their TV cable infrastructure for the provision of Internet services	**'**Castel Internet' or TCI with its subsidiary @Home
Electricity suppliers	use their electricity infrastructure for the provision of Internet services	in Germany (only trials): HEW, VEW, Bewag
Non-profit organisations	interest groups that are providing Internet services to members	Ebone
Web-farmers	provide web space	Exodus, Digital Island

Table 1: description of types of ISPs and some examples

For further analysis, it is assumed that these types of ISPs can be characterised by the degree of vertical integration and the employed input factors. A further characterisation of these different ISP-types will be applied for the comparison of the strategies of different types of ISPs: the market oriented strategy in terms of product portfolio, pricing policy and market segmentation. See section 3.2 for an explanation and section 4 for the analysis of the impact of various business strategies.

3.2 Approach

Elements in the analysis of competitive advantage of ISPs are derived from the work of Porter and others[15] and include:

15 M. Porter, *'Competitive Advantage'* (1990). A somewhat complementary approach focusing on dynamic aspects of 'strategic leverage', the freedom of maneuver and how it is created and exploited, is presented by Milind L. Lele (1992*), 'Creating Strategic leverage. Matching Company Strengths with Market*

- the concept of competitive forces, determining industry profitability (attractiveness);
- the value chain concept aiding the analysis of sources of competitive advantage and the development of strategies in the areas of cost advantages and service differentiation.

Figure 5 shows these elements in context. Competitive advantage of ISPs is a function of attractiveness of ISP market segments and the specific competitive strength of an ISP in these segments. Taking into account the trends and developments sketched out in section 2, this paper takes ISP industry attractiveness as a point of departure and focuses on the right-hand side to analyse sources of ISP competitiveness. The competitive position of ISPs depend on the combination of the type of ISP (for example telco incumbent, new backbone capacity suppliers, small regional access provider etc.) and the chosen business strategy of the ISP (a/o in terms of offered services).

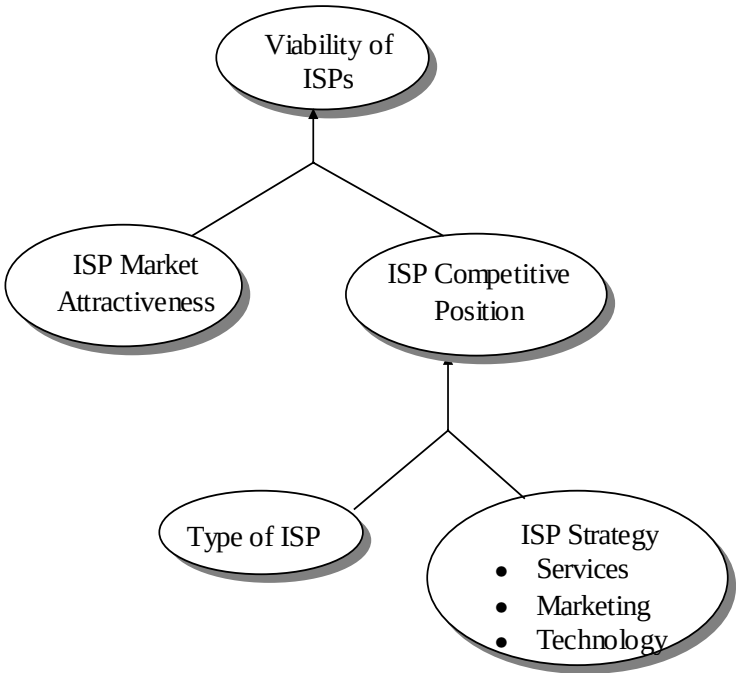

Figure 5: Framework for analysis of strategies

A first step is to identify the economic activities assembled in a value chain in providing Internet Services. The functional value chain contains the value activities to be performed by ISPs in order to be able to deliver Internet services (including IP-transport, web hosting, E-mail, telephone, Intranet, consultancy, content delivery). The functional value chain of Internet-services in general contains more than the basic activity of an ISP, which is IP-transport. Additional activities - to be performed by the ISP, other suppliers or carried out by the user himself - will complete the value chain.

Opportunities'. It develops strategies exploiting leverage in the areas of products, pricing and channeling. This approach takes into account the options available of the actors as well as the feasibility of choices in areas as pricing, targeting, products and other dimensions of strategy. Further application of this approach to the Internet business is fruitful.

This over-all functional value chain is represented in Figure 6. Value activities (A, J) are described in Table 2.

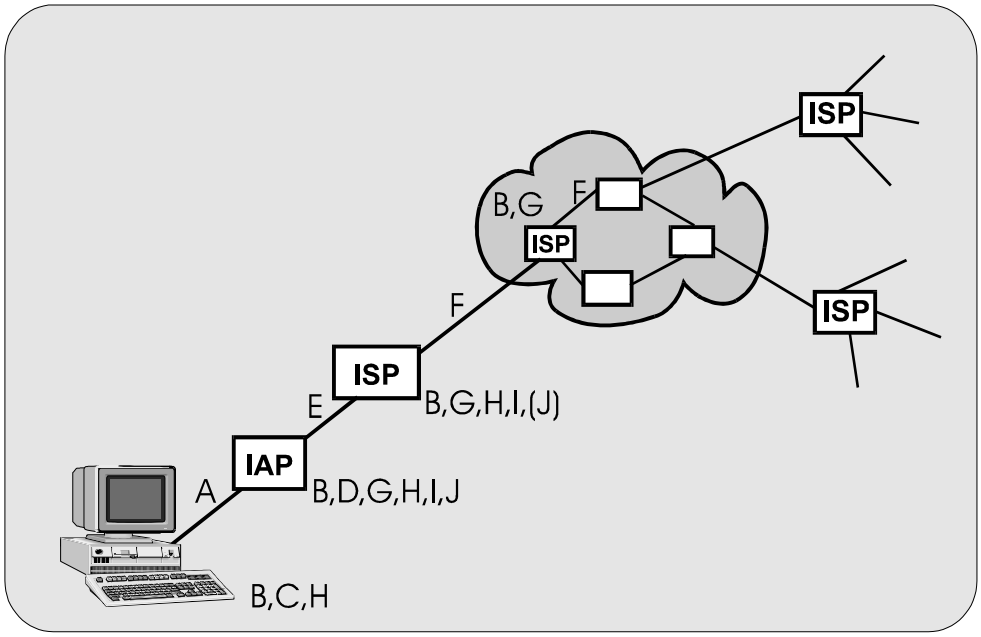

Figure 6: Functional Value Chain for Internet Service Providers

The activities of the (functional) value chain, related Internet services and main aspects of their cost structure are listed in Table 2. Focusing on the characteristics of the ISP service delivery chain (factor inputs and associated cost structure; degree of vertical integration), value activities A (supply of network accessing the Internet Access Provider, IAP), E (supply of access network), D (supply of modems to access the IAP), F (supply of backbone) and G (IP-transport) are central. How characteristics of ISPs are determining competitiveness is discussed in more detail below. To a large extent, ISP costs are of a fixed nature and strongly dependent on technology. A more detailed analysis of activity structure of different types of ISPs and the relation of cost structures to the broader market structure should take into account aspects of market segmentation, network externalities, flexibility of manoeuvre in dimensions of strategy etc. However, an outline is presented of the framework that is used to analyse different business strategies including production characteristics and their relation to competitiveness.

	Value Activity	Internet Services	Main cost Components
A.	Supply of network accessing the Internet Access Provider (IAP)	IP-transport Telephony	Lines, interconnection, hardware, software
B.	Supply of terminals		Hardware, software
C.	Converting data into transportable IP-packets		Hardware, software
D.	Supply of modems to access the IAP		Hardware, software
E.	Supply of access network (Connecting the IAP with an ISP connected with the Internet backbone)	IP-transport	Lines, interconnection, hardware, software
F.	Supply of backbone	IP-transport	Lines, interconnection, hardware, software
G.	IP-transport, covering both IP-transport and transportation	IP-transport	Lines, InterconnectionHardware, software
H.	Supply of content	Content delivery	
I.	Hosting for applications/content	Web hosting, E-mail, Content delivery	Hardware, software
J.	Off line services	Consultancy Intranet services	Marketing, sales, other expenses

Table 2: activities of the functional value chain

3.3 Dimensions determining competitiveness of ISPs

In order to analyse the impact of the various features of business strategies, a framework is built up capturing the dimensions of ISP business strategies and relating these dimensions to business characteristics and environmental variables. A framework capable to analyse business strategies for different types of ISPs should fulfil certain minimum requirements, even if it is limited first and foremost to qualitative aspects. These requirements relate to a detailed understanding of the choices in dimensions of strategy, as well as of the relationships between these dimensions and choices.

The analysis of ISP business strategies is based on five dimensions of strategy, each consisting of several features and strategic choices. Together, these dimensions constitute the type of ISP and its strategy (see Figure 7):

1. *Factor inputs*. Features of this dimension relate to technology employed, and to the quality and quantity of capital and labour inputs.
2. *Value chain structure*. Features consist of the specific value chain activities, as well as related make or buy choices, i.e. ownership vs. leasing infrastructure.
3. *Product portfolio*. We defined the basic portfolio of services as IP-transport, web hosting and E-mail facilities; other offered services are telephony, content, Intranet and consultancy activities.
4. *Pricing policy*. Pricing structures include flat fee and usage based billing.

5. *Market segmentation*. Segmentation dimensions include geographical scope (regional, nation-wide, international) and various user categories (residential vs. business).

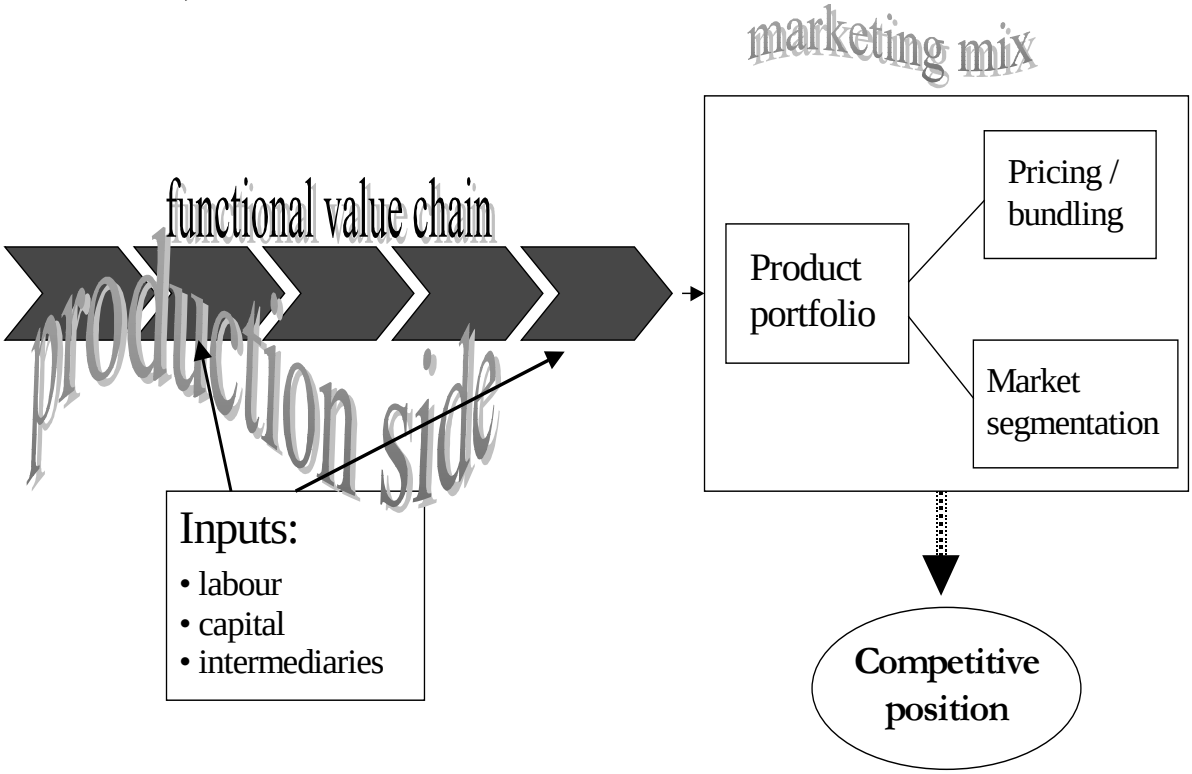

Figure 7: Conceptual framework for analysing the competitive position of ISPs

A business strategy may consist of a combination of many features. In this report, a selection of dimensions and their features is studied. The elements of the framework are visualised graphically in Figure 7. Each of the dimensions contains several features. On the factor input side both the *quality* as the *quantity* of the types of input is taken into account, such as labour, capital and intermediate products. The impact of differentiation of inputs on the competitive position will be taken into account. Factor inputs are closely related to the second dimension: the functional value chain. For each economic activity of the value chain there is a specific allocation of production inputs. The functional value chain characterises the degree of vertical integration.

The third element ‘product portfolio’ comprises options concerning IP-transport, web hosting, e-mail, telephony, consultancy, content and Intranet facilities. The fourth element ‘pricing policy’ is characterised by the combination of flat fee versus usage based pricing, and of bundled versus unbundled services. The fifth element ‘market segmentation’ is characterised by two dimensions, namely the geographical scope (regional, national, international) and the type of customers (e.g. residential customers, SMEs, large national firms, multinational enterprises).

The dimensions product portfolio, pricing policy and market segmentation together constitute the "marketing-mix" or the business strategy of the ISP (see Figure 7).

Production (cost) conditions and the marketing-mix together are the essential firm-specific dimensions determining the competitive position. However, competitive position is also affected by other market conditions such as demand, technological factors, policy and regulation, and the number and strategies of competitors.

The line of analysis within this conceptual framework is characterised as follows: for each element of the value chain there is a specific allocation of production inputs. The structure of the functional value chain combined with the choices concerning the factor inputs characterise the ISP production process and cost conditions and as such are defining the type of ISP. A competitive advantage can be obtained on the basis of:

1. a cost advantages, or
2. an advantage through service differentiation.

A competitive advantage always relates to a specified market / market segment. For a specified market a cost advantage always results in a higher profitability. In this case profitability is the suitable indicator for measuring the competitive advantage. Whenever a competitive advantage results from differentiation new market segments will be opened up. For these market segments the cost analysis has to be applied again.

This framework facilitates comparison of the competitive position of different types of ISPs. Because the ISPs differ in various aspects (expressed by the elements in Figure 7) it is necessary to identify the factors that could result in a competitive advantage. As far as two different types of ISPs distinguish themselves only in terms of one element, a competitive advantage could only be derived from this difference. In reality, however, the existing types of ISPs in all likelihood differ in more than one element. A five-step approach has been developed guiding the analysis of the impact of the various choices on the competitive position of ISPs:

Step 1: Identification of critical factors driving competitive advantage

As was discussed before, different features were identified of each dimension that determines the type of ISP and their strategies (inputs, functional value chain, product portfolio, pricing policy and market segmentation). An example is the dimension of "pricing" where it was distinguished between flat fee and usage sensitive, and further between bundled and unbundled services. This sort of analysis was performed for all strategy dimensions.

Step 2: Analysis of factors ceteris paribus affecting ISP competitive advantage

Based on the features identified in step 1 it is analysed whether and how variations in one feature will *ceteris paribus* result in a competitive advantage or not. For example, whether it is advantageous to replace flat-fee by usage sensitive pricing, *ceteris paribus*, or not. This partial analysis was carried out for a selection of features and focuses on impacts on cost advantage and service differentiation opportunities (section 4).

Step 3: Identification of the types of real world ISPs in terms of specific features
For the categories of real world ISPs that are taken into account, the dimensions and features constituting their strategy were identified. The analysis focuses on a selection of ISP-types: telco incumbent, new carrier (backbone capacity supplier), nation-wide ISP, new telco, and small regional ISP.

Step 4: Comparison of real world ISPs in terms of relative competitive advantage
The competitive advantage of pairs of ISP-types are compared on the basis of factors in their dimensions of strategy. To this end, the results of step 2 are applied to each of the selected ISP-types as defined in step 3. By combining the partial effects the relative impacts on the competitive position of the different types of ISPs can be assessed. This results in identification of the dimensions and features of the observed ISPs as well as their interrelationships that are really critical in creating leverage and competitive advantage.

Step 5: Construction of ISP industry scenarios
Finally, ISP industry scenarios are being constructed on the basis of uncertainties affecting ISP industry structure. In this study we focus mainly on the Internet technology dimension of ISP industry scenarios. Results of step 4 are taken into account in order to assess the options ISPs may consider and the room for manoeuvre ISPs may employ in order to cope with different and uncertain futures. A strengths – weaknesses – opportunities – threats (SWOT) analysis connects the information concerning ISPs relative competitive position derived from step 4 and the technology scenarios.

4 Factors affecting ISP competitiveness

In this section, distinguishing features are characterised for all five basic elements of our general framework of the previous section. Further, we analyse *ceteris paribus* whether and how choices concerning each of the features affect the cost structure or the opportunities for service differentiation of a specific ISP-type.

4.1 Market segmentation

The market segmentation is the reflection of the market oriented business strategy. The type of services, the bundles and pricing strategies aim at attracting customers. The product and price differentiation is designed for a specific market segment, which more or less represents a homogeneous group of customers. These market segments can be defined by the characteristics of the prices or services demanded or by geographical characteristics.

We distinguish the following market segments in our analysis:[16]
Geographic: regional, national, international
Customers:
- residential customers
- business customers
  - small and medium size enterprises [SME]
  - large national firms [LNF]
  - multi national enterprises [MNE]

This segmentation is appropriate for analysis. However, an extension of this segmentation may be necessary.

4.2 Impacts of factor input choices

Factor inputs represent one of the five elements that constitute the type and strategy of an ISP. Factor inputs involve the resources that are necessary for the provision of Internet services.[17] These inputs partly depend on the type of services that are offered by an ISP. Nevertheless, an ISP still has a choice to produce a specific service with alternative sets of inputs. The inputs may differ in type, their quantities and relations, and quality. Therefore an ISP has the ability to differentiate from competitors through the set of inputs he uses to provide his services.

16 We acknowledge that there is strong interaction with the product portfolio and pricing strategies.

17 It could be argued that the inputs are part of the functional value chain and therefore that it is not necessary to distinguish between the elements 'functional value chain' and 'inputs'. We have choosen this distinction to emphasize the impact of different inputs (i.e. in terms of quality) even though the degree of vertical integration is unchanged.

In analysing how differentiation of inputs affects competitive position, first it is necessary to define the offered services that are produced with these inputs. The analysis can be applied to all services, like IP-transport, e-mail, web hosting, content, consultancy service, etcetera. Second, the alternative sets of inputs must be outlined. The impact of chosen inputs are twofold:

- Impacts in costs; these might result in a *cost advantage*.
- Impact on characteristics of the output; this might result in an advantage since it *differentiates the services* from the competitors.

The service "IP-transport" is selected for the analysis of the impact of factor input choices on the competitive position of a supplier of Internet services. The main factor inputs for providing IP-transport are network infrastructure (lines, including network technology), routers and servers, labour and interconnection facilities.

The impact of two different input choices is analysed:

1. choice of quality of the input "network infrastructure" (see section 4.2.1), and
2. choice of increasing the regional scope of IP-transport by employing additional inputs (see section 4.2.2).

4.2.1 Advanced network infrastructure

The quality of the network infrastructure (different types of physical network and technologies) does not affect the use of TCP/IP protocol. The latter one is used on top of the network technology and is not affected by it. Even though the characteristics of the IP are not affected by the quality of network infrastructure, it has features that are important for the operation of the IP network and therefore for its quality of service. The dimensions of quality of service in this case are (1) bits per second (transmission capacity) and (2) reliability of the service. We analyse the impact of using *high quality network infrastructure*, instead of using the existing mature *low quality network infrastructure*. It is assumed that the supplier of Internet services owns the infrastructure.[18]

Impact on costs of using advanced network infrastructure. Advanced infrastructure and technology goes along with a higher productivity and in general also with higher costs. Whether it is advantageous to choose the new technology or not partly depends on the costs of the two alternatives: using mature (existing) technology or building up a new one. This decision is affected by the following factors:

- costs of network infrastructure, including capital costs and expenses for network operation
- productivity of network infrastructure
- risks and uncertainties concerning the life expectancy of the network infrastructure.

An advanced and high quality network infrastructure goes along with reduced expenses for network operations (labour is substituted by capital) and an increased reliability of

[18] The question of owning versus leasing is discussed in section 4.3.

network services. Improved reliability of network performance goes along with higher productivity and therefore is expressed in a higher productivity of the infrastructure. This productivity must be related to the costs of the network infrastructure to compare the two alternatives. The quantitative effects on costs depend on the individual characteristics of the already owned infrastructure and expectations on future usage, technology development, as well as the costs of bearing uncertainty. Therefore no general results about the impacts on costs can be derived.

Impact on service differentiation of using advanced network infrastructure. Features of a high quality network infrastructure, such as QoS in terms of guaranteed transmission time, are adding value to the service of IP-transport. It is likely that there exists an additional willingness to pay for this service within the market segments for residential customers as well as business customers. This is improving the competitive position of the ISP.

Conclusions. Choosing high quality network infrastructure as an input for the provision of IP-transport is resulting in a competitive advantage in possibilities of service differentiation. Whether this advantage is outweighed by a disadvantage in terms of costs, depends on the costs for the low quality infrastructure that might be already available. Furthermore, characteristics like individual expectations on future usage, technology development, and costs of uncertainty must be taken into account. Thus, no general recommendation on using high or low quality network infrastructure can be given.

4.2.2 Increasing the regional scope of IP-transport

The minimal configuration of an ISP goes along with a specific regional scope: only customers within this area can be served by that ISP. If the ISP wants to supply Internet services to more than one area he needs to build up an additional Point of Presence (PoP) in the new area and he needs additional infrastructure to connect the PoPs to the existing ones. Again, two alternatives are compared:

- increasing the number of PoPs and substituting the additional server capacity for e-mail and web hosting by a backbone router, versus
- increasing the number of PoPs without investing in a backbone router.

Impacts on costs of increasing the regional scope. An increase in the number of PoPs from one to two not necessarily doubles the costs, even though the supplied services are the same. If the PoPs are built up independently it is likely that the costs double. But it is also possible to interconnect the two PoPs and use some parts of the infrastructure jointly: e-mail server, web server, and uplink connection to the Internet backbone. To be able to use these resources jointly, it is necessary to run a backbone router. Whether a cost advantage results from the interconnection of the two PoPs, depends on the costs for e-mail, web server and uplink connection in comparison to the costs for a backbone router. Nevertheless, the increase of the regional scope goes along with additional potential customers. An increase in the number of customers is accompanied by economies of scale: decreasing costs per customer resulting from the jointly used resources.

Impacts on differentiation of increasing the regional scope. It is likely that there are customers that have an additional willingness to pay to be able to access an ISP from different areas at local rates. These customers can be attracted by the strategy to increase the regional scope of IP-transport.

Conclusions. Cost advantages can be derived out of the operation of additional, interconnected PoPs, since an increasing number of potential customers might imply economies of scale. Furthermore, an increase in the regional scope is attractive for those customers that prefer local access to their ISP independent of their location.

4.3 Impacts of functional value chain choices

The functional value chain structure reflects the degree of vertical integration. Whether it is advantageous to differentiate the degree of vertical integration or not, must be reflected in a cost advantage. All activities of the functional value chain can be performed by one ISP or be split up to different suppliers. The less activities of the functional value chain an ISP is performing, the lower its degree of vertical integration. There are multiple possibilities in what respect ISPs can differ in terms of vertical integration. To analyse the impact of the degree of vertical integration on the competitiveness of an ISP, a partial analysis is done. Choices concerning vertical integration are compared and the impact on competitive position is analysed with respect to cost advantage. Examples of choices in the degree of vertical integration are shown in Table 3.

With		Without	Activity*)
Supply of network facilities (telephony access, IP access and IP backbone network)	*Versus*	Outsourcing of network facilities	A, E, F
Supply of e-mail server	*Versus*	Outsourcing of e-mail server	I
Supply of web server	*Versus*	Outsourcing of web server	I
Supply of dial up access	*Versus*	Outsourcing of dial up access	D

*) Activities of the functional value chain. See Figure 6 and Table 2.

Table 3: Analysing differences in vertical integration

The focus here is on the first example: supply of network facilities. We analyse whether it is advantageous to *own* infrastructure in comparison to *leasing* it. It is assumed that only the services of the basic portfolio (IP-transport, web hosting and email facilities) are supplied. To identify economies of scope that could result out of a higher degree of vertical integration, we need to take into account not only the activities of A, E and F but also the activities for IP-transport, G, as well as for e-mail and web hosting, I. The ISP owning the infrastructure could represent either a telco incumbent or a new carrier such as MCI/Worldcom.

Costs of vertical integration of network supply

A number of variables have been identified that may have an impact on the costs of the two alternatives. These variables, their impact on the relevant costs and their effect on the attractiveness of owning or leasing infrastructure are represented in Table 4. Whether a cost advantage can be derived from owning or leasing infrastructure, depends on the individual resources and perspective of each player. The overall impact of all variables on costs cannot be assessed without further data.

Factor	Factor impact on costs	Increases relative attractiveness of
Scarcity of venture capital	Increases capital costs for building up an own network	Leasing infrastructure
Scarcity of rights of way	Increases costs for building up an own network	Leasing infrastructure
Uncertainty about demand, regulation and technology together with the required time for building up an own network	Increases the risk of cost recovery of the investment in owning infrastructure	Leasing infrastructure
Ability to control the network and its quality	Own infrastructure lowers the costs of unstable network performance and QoS	Owning infrastructure
Complexity of business focus	Own infrastructure increases the co-ordination costs	Leasing infrastructure
Scarcity of infrastructure on the wholesale market (monopolistic prices on the wholesale market)	Increases the price for leasing	Owning infrastructure

Table 4: Factors affecting choices of value chain structure

Demand side related aspects of vertical integration of network supply

The vertical integration of network supply does affect the demand side in two respects:

- The self-production of network facilities with the possibility to control the performance of the network can be interpreted as a service differentiation. A higher reliable QoS can be offered with own infrastructure that is operated by the supplier himself. It is likely that within both market segments (residential and business customers) there are customers that are willing to pay a higher price for that reliable QoS. These customers will be lost if the control of QoS is not possible for the ISP.
- Apart from owning network facilities for own production an ISP can also offer his network facilities to other suppliers on the wholesale market.[19] Especially if the market for bandwidth is still quite monopolistic, this is an attractive market segment. Therefore the advantage that could result out of the provision of infrastructure on the wholesale market, needs to be taken into account for evaluating the alternatives *owning* or *leasing* infrastructure.

[19] Here we identify the impact of the vertical integration (supply of network infrastructure) on the attractiveness of an altered product portfolio. Because it is closely related to the infrastructure question, we take account of it within the analysis of vertical integration.

Conclusions
Vertical integration in combination with self-provision of infrastructure results in competitive advantages. Whether a cost advantage can be realised or not, depends on several cost factors (see Table 4 for examples) that need to be quantified.

4.4 Impacts of product portfolio choices

The product portfolio represents the type of services an ISP is offering. The product portfolio is reflecting one element out of five that are defining the strategy of a supplier (see Figure 7 in section 3.3). The starting point is a basic portfolio, which is assumed to be offered by all ISPs. The basic portfolio includes e-mail, web hosting and IP-transport.
The impact of service differentiation is analysed by offering additional services to the basic portfolio and by differentiating the quality of a supplied service. The impact on the competitiveness will be derived for the supply of:
1. Telephony services (section 4.4.1)
2. Consultancy services: web creation and helpdesk (section 4.4.2)
3. Consultancy services: intranet / extranet (section 4.4.3)
4. Content services (section 4.4.4)

4.4.1 Telephony services

Basic portfolio (including dial up access) and telephony services

An ISP that is offering telephony services besides the basic portfolio is differentiating his product portfolio.[20]

Characteristics of the service and regulatory aspects

For the supplier, providing telephony services goes along with the ability to offer his customers a dial up connection (activity A of the functional value chain). This dial up connection is nothing but a telephone connection between the customer's modem and the ISP. Usually the customer has to shop around:
(1) dial up connection bought from a telco,
(2) Internet services from an ISP.

We now analyse the strategy to supply both: telephony services (including dial up connection) and Internet services (basic portfolio and modems for dial up access) in comparison to the stand-alone supply of Internet services (without telephony).

[20] It could be argued that the supply of telephony services should be interpreted as a kind of vertical integration, reflected in the degree of vertical integration (supply of dial-up connection). But it can also be interpreted as a service differentiation of this ISP, because it goes along with an extension of the product portfolio offered to the customers.

Because the supply of telephony services is regulated in most countries, and regulation is influencing the costs of providing these services, we need to specify the regulatory environment.
To offer telephony services licences for voice and network operations are required. The precondition to acquire a licence is the operation of transmission lines. At present that could be a single switch. These licences give the "operators of transmission lines" the right to interconnect with other suppliers of voice services at administered prices, that are by far lower than the prices the end user faces. The supplier of telephony services sets the price for the end user himself.

Costs of supplying telephony services

To analyse whether competitive advantages can be derived from the supply of telephony services, we distinguish the following strategies:

(1)telco strategy: supply of telephony service (incl. dial up connection), basic portfolio and modems for dial up access
(2)stand alone strategy: supply of basic portfolio and modems for dial up access

The costs of supplying telephony services consists of fixed costs for infrastructure and licence and variable costs for the transmission of voice or data. These costs are independent of the type of traffic that is sent over the network (basic telephony service or dial up connection to an ISP).
We compare the costs of both alternatives. Therefore we look at the costs for the basic portfolio (including modem access) and the costs for the dial up connection.

- Implications for the costs of the basic portfolio (including modem access):

Because the telephony service has no direct influence on the costs of the basic portfolio (incl. access), no advantages can be derived from this.

- Implications for the costs of dial up connections:

To analyse the impact of the supply of dial up connections, the costs of the telco strategy of supplying the dial up connection needs to be compared with the market price of the telephony connection. The customer is facing this price while connecting to a stand-alone strategy. With the telco strategy a cost advantage only can be derived if the market price exceeds the costs of providing a dial up connection. Given this precondition, an ISP that is also supplying telephony services can offer this service at a lower price.[21]
This makes it possible to attract customers from ISPs that conduct the stand-alone strategy, because their customers pay the market price for telephony services. However, it might be that this competitive advantage will not last. This depends mainly on two aspects:

- competition might drive down prices for telephony services,

[21] Unfortunately, we do not know whether the market market price for telephony services/dial up connections is reflecting the costs. In countries where the telecommunications industry just is liberalised it is likely that prices exceed costs.

- players using the telco strategy might not offer the distinct services (telephony and Internet services) with the same expertise as players that are conducting a stand alone strategy and thus can focus on their core business.

Costs of supplying nation-wide telephony services

Besides the product portfolio, we also consider additional elements of the strategy of an ISP. Apart from the supply of telephony services, we now take account of the regional market segmentation and pricing.

As already outlined the ability to attract customers not only depends on the prices for the Internet services but also for the dial up connection. This ability to influence the price for the dial up connection is different for the telco strategy and the stand-alone strategy. If the players offer their services on a nation-wide scope, they can affect the price for the dial up connections in the following way:
Stand alone strategy: because the supplier is dependent on the tariffs of the telcos, the lowest dial up tariff is the local rate; to make it possible for his customers to dial in from any region within the country, he needs to set up PoPs in all local loops.
Telco strategy: because the supplier is offering telephony services, he can set the price for the dial up connection individually[22]; instead of setting up the PoPs he must bear the costs for offering the dial up connection

Based on this distinction, we identify whether by conducting the telco strategy a cost advantage can be realised out of substituting PoPs by low priced dial up connections. To analyse this we need to take account of the following cost elements:
- costs per PoP and number of additional PoPs
- costs for additional lines at the remaining PoP (to replace the lines of the substituted PoP)
- costs of the provision of dial up connections

The telco strategy goes along with a cost advantage if the costs that have to be borne for the PoPs exceed the costs for the supply of dial up connections plus the additional costs for lines. The likelihood of this cost advantage increases with the number of PoPs that are necessary to provide nation-wide access at local rates, as well as with decreasing licence fee, interconnection costs and costs for telephony infrastructure. Which effect is dominating, can only be derived on the basis of empirical data. Many co-operations and acquisitions of ISPs and telcos (suppliers of telephony services) can be observed. That might be an indicator of the advantages of offering telephony services next to the basic portfolio of Internet services.

22 In Ireland it came up that a telco wanted to set a different price for an ordinary telephony service and a telephony service for a dial up connection to an ISP (lower price for the latter service). That was the reason for the Irish regulatory authority to call the EU (DIRECTORATE-GENERAL IV - COMPETITION) for clarifiying whether this pricing is in accordance with the EU law.

Demand side related aspects of additional supply of telephony service

We analyse the impact of the strategy 'additional supply of telephony services besides the basic portfolio' on the demand side. Thus, we are asking if the supply of telephony services enables the ISP to attract customers more easily than without telephony. E.g. whether it is possible to realise advantages out of cross selling or not.

A precondition for attracting customeror is the fact that customers need to know about the existence of a supplier. This knowledge goes along with information costs. They can also be interpreted as information costs for setting up a customer relation. These costs have to be borne either by the customer or by the supplier himself. To attract customers the suppliers usually tries to transfer these search costs from the customer to themselves to reduce the price (costs of buying) for the customer.

The market for telephone services is more established than the market for Internet services, and telephone penetration is much higher than penetration of Internet access. Therefore it is likely that suppliers of telephony services are better known than ISPs. Therefore it is much easier for suppliers of telephony services that are already established, to contact potential Internet customers (and vice versa) than it is for a stand alone ISP. That is because they already set up a customer relation that they use for selling the Internet services.

The market segment that is mainly addressed by this cross selling strategy is the segment of residential customers. Only a little portion of the residential customers could be called 'insiders' with respect to the market for Internet and information technology. The rest of the residential customers are facing high search costs. Therefore they can be attracted more easily by their telephony companies that offer IP-services than by stand-alone ISPs. This advantage sometimes is strengthened by regulation: in some countries mailings or telephony advertisements are only allowed if the company already had contact with the individual.

This competitive advantage mainly arises from offering telephony services. It incorporates an advantage by service differentiation that results in reduced transaction costs because of cross selling. To what extend this strategy can be copied depends on the licensing conditions of the regulatory authority in the specific countries.

Conclusions

With the provision of telephony services besides the basic portfolio (incl. modem access) competitive advantages in terms of costs and differentiation can be derived. The cost advantage can result out of the ability to offer dial up connections to a lower price than the market price. Furthermore, a cost advantage can result from substituting a PoP by low tariffed dial up services. This is even more likely if the regional scope of the market activity is quite large and thus there is a large number of PoPs that can be replaced.

A differentiation advantage can be derived from the diversified product portfolio: The strategy of supplying telephony services and Internet services enables a supplier to realise advantages from cross selling.

Impacts of bundling basic portfolio and telephony services

Again, we analyse the impacts of supplying telephony services besides the basic portfolio (incl. modem access). But now we also take account of an additional feature of the supply of telephony services. This is the *bundling* of dial-up connection and IP-transport. Bundling on the one hand affects the costs of pricing; on the other hand it might affect demand. Both impacts are taken into account.
We analyse whether it is advantageous for a supplier that is offering the basic portfolio and telephony services to bundle these services or not. We concentrate on the impact of bundling, as far as bundling leaves the characteristics of the offered services unchanged.

Impacts on costs

The strategy of unbundling implies that all services need to be priced separately. Bundling, on the other hand, makes it possible to reduce the pricing effort to one packaged service. This implies that the costs for pricing Internet services (IP-transport) can be eliminated by setting a per minute price for the dial up connection that also incorporates the price for IP-transport. Both services are often priced usage sensitive (usage in terms of time of usage). And because dial up connection and IP-transport are complementary services, the metering of one service also indicates the usage of the other one.[23] Therefore bundling reduces the necessary effort and infrastructure for pricing these services. Thus a cost advantage can be derived out of it. To quantify the degree of this advantage empirical data is necessary.

Advantage by service differentiation

Prices indicate the costs that a customer has to bear for a service. Because Internet services are a conglomerate of services, the customer has to sum up the prices for all services he is demanding. To decide whether an additional usage of Internet services is advantageous for himself or not, the customer has to monitor his costs.
In case the services of IP-transport and dial up access are offered unbundled, the customer has to calculate, whereas the bundled services would reduce this effort. In general, as long as the customer can not easily monitor the price he has to pay for accessing the Internet, he has to bear the costs for monitoring it himself or for a non optimal usage behaviour (if he decides not to bear these monitoring costs). The costs for the dial up access are not separately outlined in his general telephone bill.
The customer does not incur these costs when the telephony access service and IP-transport (Internet access) are offered bundled. Therefore, the additional provision of telephony services can result in a competitive advantage.

[23] That is not the case anymore if the usage sensitive price for IP-transport depends on the number of transferred bytes or IP-packets.

However, this strategy of bundling IP-transport and dial up access does not have an impact on all customers. It is only of relevance for a target group within the market segment of residential customers with a willingness to pay for this service.

Conclusions

The bundling of telephony and IP-transport increases the competitiveness of a supplier that is offering telephony services besides the basic portfolio. This results from the ability to reduce costs for pricing and, with this, the transaction costs for the customer can be reduced.

4.4.2 Basic portfolio plus consultancy services: web creation and helpdesk

Consultancy services include support services for web creation, helpdesk services and so on. The first question is whether an ISP should offer consultancy services at all; if the answer is 'yes', then the second question is: what kind of consultancy services should be offered.
The answer to the first question is simple: a cost advantage cannot be realised with the additional supply of consultancy services.[24] But if there are customers that are demanding this service and have a preference for one stop shopping, it is improving the competitive position of an ISP in comparison to those ISPs that do not offer consultancy services.

Since this strategy can be easily copied the question then is: what kind of consultancy services should be offered to differentiate from competitors? In general, two strategies for providing consultancy services exist:
1. developing standardised solutions and offering these to all customers irrespectively of their specific needs.
2. offering consultancy services customised to the specific needs of a customer.

It can be observed that ISPs with many customers are providing consultancy services in the form of standardised solutions, such as frameworks for web page creation.

Cost impacts of providing customised and standardised consultancy services

The costs of providing consultancy services are only partly related to the fact that an ISP is already providing the services of the basic portfolio. The most important cost component of this service is personnel costs.
Here we assume that for the provision of consultancy services it is necessary to hire additional manpower. Two important cost characteristics of these consultancy services are:

- The costs of developing standardised solutions (that is, fixed costs) are rather high while the variable costs are quite low. Average costs (per customer) are decreasing and thus there are large economies of scale. These high fixed costs can only be recovered if a large number of customers make use of the standardised consultancy

[24] Cost aspects are of relevance only for the different types of consulting or different production functions to provide this service with.

services. A small ISP does not have so many customers. Furthermore, since their turnover is lower, it is also more difficult for them to find the money to invest in the development of standardised consultancy services, without being paid directly for them.

- The costs of providing customised consultancy services are characterised by the low fixed costs and the relatively high and constant variable costs. The marginal costs per customer of customised services are much higher than the marginal costs of providing standardised services, once these standardised services have already been developed (see the slopes of the functions in Figure 8).

In Figure 8 these remarks are illustrated by means of a plot of the costs for providing consultancy services.

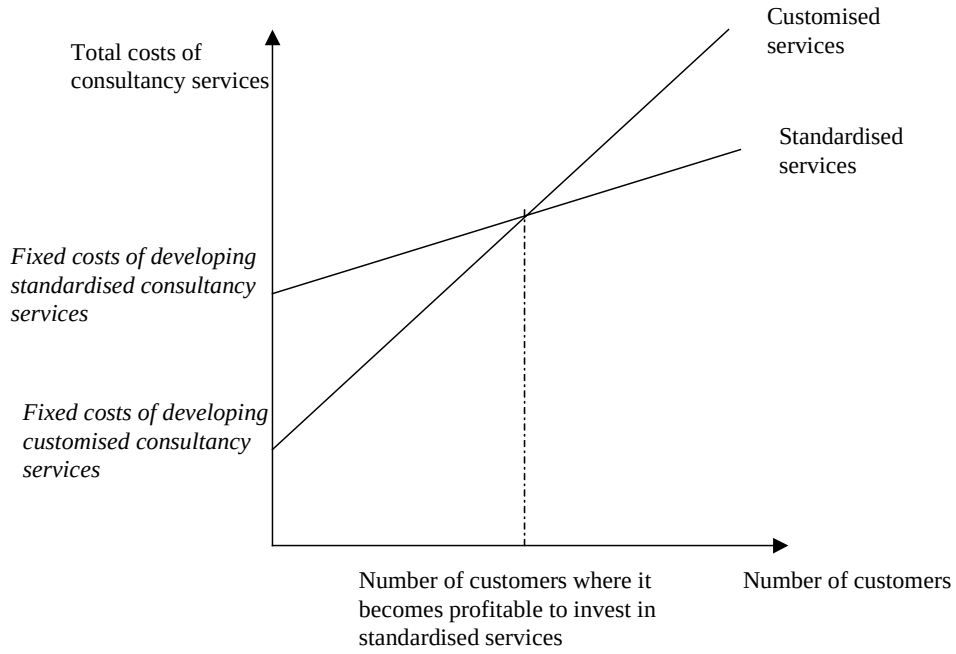

Figure 8: Impression of costs of providing consultancy services

Only if there is a large number of customers having more or less the same requirements, a standardised service is more advantageous.
Small ISPs usually face restrictions on the input side. They do not have the resources that are necessary to serve a number of customers that makes it worthwhile to standardise their consultancy service. (left part of Figure 8)

Market position – demand side

The provision of consultancy services can be an important reason to prefer one ISP to the other. What type of consultancy services are demanded differs between the various market segments. We distinguish between:

- Residential customers (RC)
- Small & medium sized enterprises (SME)
- Large national firms (LNF)
- Multi-national firms (MNF)

In general, most customers prefer customised services to standardised services. But a lower price of a standardised service might outweigh this.

There are many residential customers, SMEs and LNFs demanding consultancy services. Therefore it might be worthwhile to offer standardised services for these market segments. In contrast, the market for multi national enterprises (MNEs) is not suitable for standardised services, because an ISP is not able to recover the costs for standardisation with a relatively little group of potential customers. Apart from that MNEs often have enough money to invest in their own Internet expertise group and thus do not need additional consultancy services.

As already mentioned, ISPs that do have the resources to invest in standardisation are able to offer their service at lower prices than without standardisation. Whether it is possible to compete in the market without standardising depends on two factors: (1) the ability to offer value added customised consultancy services with little resources, (2) the existence of customers that are preferring the customised service despite the lower price of the standardised consultancy.

It is assumed that with the size of the customer (residential customer<SME<LNF<MNE) the minimum resources for offering adequate customised services are increasing.[25] Thus the ability to offer value added consultancy services with less resources than standardised services is limited to the market segments with smaller customers.
At this stage of the analysis, it is not possible to draw an exact line between the market segments that still can be served with customised services of 'small ISPs' and those that can not. Therefore data on costs and available resources are needed. Because these figures are not available, we assume that small ISPs supply customised consultancy services only to residential customers and SMEs.

Since an ISP that is employing more resources is able to offer standardised services, it is not likely that he offers customised services to a market segment he is already offering standardised consultancy services: Having invested in standardising, the ISP is interested in raising the profitability of his investment. Therefore he tends to offer standardised services rather than customised services.

Based on the above we can derive that on the market for residential customers and SMEs the ISP with little resources will only offer customised consultancy services. On these markets he is competing with the ISP that is employing many resources and that is therefore offering standardised consultancy services. Whether the small ISP will be able to compete or not, depends on his ability to differentiate his service from the standardised ones. A precondition for his success is the existence of customers within these market segments that are better off choosing the more expensive customised

[25] In the figure we only refer to the costs of supplying services to one market segment.

consultancy service than the standardised one. He will not compete in the markets for LNFs and MNFs.

ISPs with many resources (‘large ISPs’) have an advantage in consulting large customers because of their bigger manpower. As long as it pays off, they try to standardise their service. This is likely for the markets for residential customers, SMEs and LNFs. They also have the possibility of engaging account managers for specific types of large customers, thus having an exact idea of what their customers require. Because there are not so many MNEs it is possible that standardising does not pay off and therefore even large ISPs only offer customised services. On this market they definitely do not compete with 'small ISPs' because the latter do not have enough resources to serve these big customers.

With respect to the regional market segmentation it is obvious that small ISPs only act in the region of their location, whereas large ISPs offer their services with a larger regional scope. The fact of being close to the customer is strengthening the ability of small ISPs to offer customised services. The closer contact to their customers makes it easier for them to have a personal approach.

Conclusion

In general, the provision of consultancy services is an attractive feature of an ISP for potential customers. Especially offering customised consultancy services can secure the attractiveness of small regional ISPs for a specific group of potential customers within the market segments of residential customers and SMEs. There are two important reasons for this:

1. These customers often do not have the ability to do without consultancy services (especially helpdesk and support for web page creation). They are better off taking customised services and paying a higher price instead of choosing the cheaper standardised service.
2. Offering customised consultancy services and being close to the customer makes it possible to differentiate from the standardised services.

The results of analysing the attractiveness of offering consultancy services to the different market segments are summarised in Table 5.

	Small ISP (little resources)	**Large ISP (many resources)**
Residential customers	Customised	Standardised
Small & medium enterprises	Customised	Standardised
Large national firm		Standardised & customised
Multi-national firm		Customised

Table 5: Successful consultancy services

4.4.3 Basic portfolio plus consultancy services: intranets / extranets

Here we consider the case of offering Intranet services. From a technological perspective an Intranet is characterised by the use of TCP/IP but by definition it is not part of the Internet. Even though it might be connected to the Internet, it is not possible to get access to an Intranet via the Internet. An Intranet that is connected to the Internet is always secured by firewalls to protect it from Internet users.
Multiple offices of the same company may also use an Intranet. In this case you either need dedicated lines between these offices or an ISP that offers secure IP-services.
The main difference between an Intranet and an extranet is that the extranet not only connects locations of *one* company but also of several companies. In general these companies are permanently interacting.

The supply of Intranets is closely related to the supply of other (private) data networks. Therefore, not only ISPs but also other providers of data networks that have not necessarily entered the Internet market yet, are acting on the supply side of the market for intranets.

Costs of providing Intranet / extranet – supply side

The provision of Intranet services requires sufficient expertise on technological aspects of Intranets. Furthermore, the customer needs network infrastructure (lines, hard- and software).
ISPs have expertise in configuring IP-networks. This expertise can be used to offer consultancy services (either the employees have free capacity or they can train the new personnel). As far as this expertise is scarce, suppliers of Internet services have a competitive advantage over other suppliers of data networks. Within the group of ISPs the competitive position is improving the expertise in configuring IP-networks. We do not have any data on the distribution of IP-expertise over the different types of ISPs, but we assume that there are big differences.

Whether a cost advantage can result from the availability of network resources that were not rfully employed, depends on the advantages of owning network infrastructure instead of leasing it.

For the provision of lines for Intranet services, it is an important aspect whether the supplier owns the lines or not. That is because the owner is able to control his network and thus is able to offer a more reliable quality. The same holds for network equipment.

If a customer has a strong preference for one-stop-shopping then the ISPs that also provide network infrastructure (for example incumbent telcos and new carriers), have a competitive advantage over ISPs that do not offer network infrastructure.

The provision of Intranet services is a rather standardised service. As with the consultancy services in section 4.4.2 the larger ISP has a cost advantage over the smaller ISP. Furthermore, it is an advantage when the ISP has control over the relevant network.

Demand of Intranet / extranet

Intranets are only demanded by business customers. In general, the SMEs demand Intranets within one office, LNFs demand Intranets distributed over multiple offices in one country and MNFs demand an Intranets distributed over multiple countries.

The demand for Intranets is not necessarily related to the demand of other Internet services, like the basic portfolio. Since there are customers that demand the basic portfolio as well as Intranet services, it might be attractive for ISPs to enter the market for Intranets.
The ability to compete on this market not only depends on the available resources, but also on the requirements of the business customers.

Necessary but not sufficient preconditions for a successful supply of Intranet services are different for the different market segments:
SMEs:
- expertise, little manpower
- (lines, in a local area)
- hard- and software

LNFs
- expertise, considerable amount of manpower
- lines, on a nation-wide scope
- hard- and software

MNFs
- expertise, huge manpower
- lines, on an international scope
- hard- and software

The conclusion is that a supplier that is capable of offering Intranets to SMEs is not necessarily capable of acting on the market for MNEs.

Besides the requirements mentioned above, a supplier can improve his competitive position by taking account of the customer's preferences. Because the provision of Intranets of reliable quality is quite complex, customers might have a preference for one-stop-shopping. In that case they only have to deal with one supplier, who is responsible for the overall quality and for handling the problems of co-ordinating the configuration of the network and the physical infrastructure together.

When a supplier is not able to offer the entire Intranet service on a stand alone basis, he can co-operate with other suppliers and set up a consortium that offers the service to the customer.

Anyway, it is likely that suppliers whose target group consists of business customers have an advantage over suppliers that do not. Because of their experience with business customers, it is easier for them to handle their specific problems.

Conclusion

By supplying Intranet services an ISP can increase the number of market segments he is aiming at. This is more advantageous for ISPs that are already established in the market for business customers than for others. Whether he is able to sustain this advantage depends on his specific expertise and, as far as he does not offer a complete Intranet service, on the expertise of the other suppliers.

4.4.4 Basic portfolio plus content: content with unrestricted access

Most of the ISPs provide content, in one way or another. We distinguish several kinds of content, that is *general* (for example weather, traffic, news and so on) and *specific* content. 'Specific content' is: content for a specified target group of customers. A target group can contain of customers in a specific region (for example regional news, culture in the region) or customers demanding content on a specific topic (for example genealogy); see Figure 9.

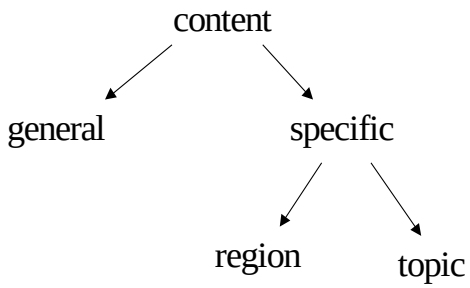

Figure 9: Specification of content

The supply of content can be highly differentiated. It is possible to choose between different types of content. An exhaustive list would define all possible different topics of content and cover all possible regions. The supplier not only has to decide on the type of content to be offered, but also whether a customer has to pay for the content or not. In our analysis, we restrict ourselves to the comparison of the non-restricted supply of content and no provision of content at all. Thus, the overall impact of supplying content on the competitive position of an ISP cannot be derived.

Cost structure of providing content

From the viewpoint of the content provider, the costs of supplying content are characterised by high fixed costs and low variable costs, in general. Besides, the costs of supplying content are determined by the type of content and its scarcity.

Because reproduction of the content for additional customers is cheap, and thus the variable costs are low, the impact of the fixed costs on the average cost per customer is

high. With an increase in the number of customers considerable decreases in average costs per customer can be realised.

Besides the costs for content the ISP has to bear the costs for hosting the content (mainly storage capacity on a server). This cost element is likely to become more and more important, since future developments promote a shift from data-oriented content to multi media information. The latter one needs much more storage capacity. Furthermore the costs of providing content depend on the frequency of updates the provided information needs.[26]

Demand for content

In general, the additional provision of content besides the basic portfolio increases the number of market segments that the ISP might serve. When customers demand all services that the ISP is supplying and if they have a preference for one-stop shopping (to reduce transaction costs) then the ISP can increase his attractiveness by supplying content. But as far as the ISP is providing this content not exclusively to his subscribers, all Internet users can access the content without paying a price for it. Therefore, in that case, the provided content and its packaging will not attract new customers. The only advantage for a customer could be a faster access to the content than via another ISP.
When providing a specific type of content involves high costs and an ISP cannot generate any revenues from the supply of this content, he will not enter this business. Supply of content is advantageous only if the ISP can generate revenues by publishing advertisements together with the provided content. Because the advertisers are paying for the ads depending on the number of hits (a hit indicates that a user has visited the web site), an ISP has an incentive to supply content that is attracting customers.

For content provision it makes sense to differentiate between market segments. Besides the supply of general content that is demanded by nearly every customer, markets can be segmented according to the different topics and regional content.

Whether it is advantageous to enter the content business or not depends on the content specific expertise that is necessary to be able to compete on this market. To provide such expertise, many resources are needed (especially for content that needs to be updated frequently; note: with increasing frequency it is likely that users are also visiting the web page with the same frequency, this increases the number of hits and therefore the revenues generated by advertisements). When the extension of the portfolio of provided services has a negative impact on the quality of a single service it

[26] The importance of storage capacity with respect to content for the strategic positioning of an ISP is indicated by the action of UUNet: the strategy of UUNet with regard to content is to use so-called mirror sites or proxies where they store frequently demanded information (cf Starr report on Clinton – Lewinsky). The consequence is that UUNet prevents congestion but against additional costs for storage capacity. This strategy is only valid for content which is not frequent altered (such as reports, but unlike weather forecasts, information on road congestion and so on).

is more advantageous not to extend the product portfolio but to concentrate on the core business.[27]

Conclusions

If

- the costs of providing content is independent of the number of customers and of the number of hits, and
- the revenues of providing content increases by the number of hits,

then it is likely that only a few players with high expertise will compete on market segments for providing (general or specific) content.

Concerning the *provision of content* in addition to the basic portfolio, the strategic options and trade-offs are of a very complex nature. Important issues are the necessity of a choice between offering content *or* efficient network service provision, the pricing of information, arrangements concerning access and property rights, etcetera. The cost aspect of storage, IPR etcetera is likely to become more important with the shift from data-oriented to multimedia-oriented and targeted information.[28]

4.5 Pricing policy and bundling

Besides market segmentation and the product portfolio, pricing policy is the third element of the market oriented business strategy. We take into account two aspects of pricing:

- Pricing itself induces costs (accounting and billing systems).
- The pricing policy can attract customers

Pricing strategies are reflected in tariffs. A variety of tariffs can be applied. We selected those pricing strategies that are applied by ISPs:

- usage sensitive: costs for a customer is dependent on its usage behaviour
- flat fee: fixed price for a customer, independent of usage
- combinations of usage sensitive and flat fee

Due to a growing number of persons and institutions accessing the Internet, congestion will become a more important issue in the future. We speak of congestion when approximately 50% of the bandwidth is in use. Some remarks in this respect:

- at present flat-fee pricing is a logical and understandable thing to do from an economic point of view: the use of bandwidth has no alternative costs when there is plenty of space

[27] Ovum Ltd. concluded that ISPs need to *choose* between offering *either* top-quality content *or* efficient network services, instead of doing both poorly. The fact that, if providing both they are providing it poorly, is a consequence of the fact that ISPs fail to establish a competitive position in both markets (source: internetnews.com).

[28] Economic and strategic aspects of information provision including the associated trade-offs are covered in Shapiro and Varian (1999).

- in order to handle congestion, we can use pricing mechanisms that allocate the scarce resources (i.e. bandwidth) more efficiently, for instance through the introduction of a protocol for differentiated services[29].
- Internet 2 will increase both the supply of bandwidth (through more advanced technology and protocols), and the demand for bandwidth (through more possibilities for multi media services and better QoS).

To handle the IP-traffic efficiently requires a good pricing strategy.

Different usage sensitive pricing strategies can be based on:

- time of usage and time online; capturing the costs for dial up infrastructure
- number of transferred and received IP-packets; capturing the costs for routing capacity
- number of transferred and received bytes; capturing the costs for bandwidth

In our analysis it is assumed that usage is related to costs. Furthermore, it is assumed that the quality of the services is not affected by the pricing and that the prices are set per service. The latter assumption will be altered while analysing bundling as a specific pricing strategy. We compare the impacts of usage sensitive pricing as an alternative to flat fee pricing.

4.5.1 Usage sensitive versus flat fee pricing

Cost impacts of usage sensitive and flat fee pricing

Usage sensitive pricing itself requires the metering of usage and the allocation of the used quantities to the customers.[30] This is absorbing more resources than with flat fee, because metering and accounting is not necessary with flat fee. Therefore the strategy of flat fee pricing goes along with a cost advantage.

Demand side related impacts

The pricing strategy not only affects costs but also the behaviour of the customers. We assume that customers do differ in their usage intensity. Furthermore, we assume that prices recover costs.

To outline the impacts of the pricing strategy on user behaviour, we look at the market segment of residential customers and distinguish two cases:

- the customer is certain about his usage behaviour
- the customer is uncertain about his usage behaviour

[29] See for a framework of diffserv: http://www.ietf.org/internet-drafts/draft-ietf-diffserv-framework-02.txt

[30] An ISP which offers usage sensitive pricing also bears the costs of the accounting and billing systems. It is not clear whether there are significant economies of scale on accounting and billing systems with the number of customers as the variable. If there are, then an increase of the number of customers of an ISP will increase his cost advantage.

Certain usage behaviour

When the costs for pricing are the same for both pricing strategies, the under average user is better off demanding the usage sensitive price. This will affect the calculation for cost recovery: because of adverse selection the flat fee is not adequate to recover costs.
This disadvantage of the flat fee strategy can be outweighed by the costs for the usage sensitive pricing itself. Depending on the cost differences of the pricing costs of both strategies and the distribution of usage behaviour, it is possible that adverse selection not necessarily takes place. The higher the cost difference and the less the variance, the more likely it is that the flat fee strategy is more advantageous than the usage sensitive one, also with respect to cost recovery.

Uncertain usage behaviour

Uncertainty of usage behaviour refers to the fact that the customer is uncertain whether his usage behaviour will be above average *or* below average. We distinguish between risk averse and risk indifferent customers.
The risk-averse customer might be willing to pay an additional price to eliminate the uncertainty of bearing high usage costs. Therefore he might prefer a possibly higher flat fee price, to avoid the risk of bearing higher costs in the usage sensitive case.
The risk indifferent customer does not care about uncertainty and therefore is not willing to pay a higher price. He will react in the same way as under certainty.
Thus, under uncertainty both pricing mechanisms are sustainable.

Conclusions

Because of the higher costs for usage sensitive pricing itself, the flat fee can be a sustainable strategy. If the metering costs are coming down, the flat fee is only attractive for risk-averse customers that are uncertain about their usage behaviour.

4.5.2 Bundling

Pricing strategies can also be divided in:
- Bundling: the customer is charged only once for the complete portfolio; from the viewpoint of the customer, the costs of a service are dependent on other demanded services
- Unbundling: the costs of a service are *in*dependent of other demanded services (viewpoint of customer) and the customer is charged per service.

In some respects, bundling has the character of flat fee pricing: a set of services is priced as one commodity, no matter to what extent the customer makes use of the different services.

To analyse the differences between these pricing strategies we analyse whether it is advantageous to offer the basic portfolio bundled or unbundled.

Cost impacts of bundling and unbundling

If billing costs increase with the number of billed services, it is less costly to offer bundled services than unbundled services. Therefore a cost advantage can result from

bundling. In comparison to other cost elements this cost advantage might not have a big impact on the overall competitive position. This needs to be validated with empirical data.

Demand side related impacts of bundling and unbundling

We distinguish between customers that are demanding all services of the basic portfolio and those who are only demanding one or two services of the basic portfolio. Assuming a customer who only demands e-mail facilities. This customer would prefer an ISP that offers its services unbundled. In a bundled portfolio this particular customer also would have to pay for the other services.
The same reaction can be expected from a customer that needs the whole basic portfolio but has different quality requirements for each service. The bundle only by chance fulfills these different quality levels. Therefore such a customer would prefer to buy the services unbundled.
Nevertheless, there might be customers with homogeneous preferences that demand all services of the basic portfolio. They might prefer bundled services over unbundled services, because of the lower transaction costs. For this market segment (demanding the whole portfolio) the bundling results in a competitive advantage.

4.5.3 Conclusions

Because of accounting and billing costs, a cost advantage can be derived from bundling. The differentiated demand in terms of services and qualities has a countervailing effect on the competitive position.
When there is a market segment with homogeneous preferences for a basic portfolio, bundling will be an advantageous pricing strategy. In that case both strategies are sustainable.

5 Constructing ISP industry strategy scenarios

5.1 The role of scenarios

Construction of ISP scenarios is an important vehicle for the development and assessment of strategic options for ISPs. Scenario development starts with identifying the uncertainties in the ISP external environment – technology, ISP industry competitive forces - and making assumptions concerning these uncertainties as a basis for obtaining a consistent view on future ISP industry structure developments.[31] The identification of strategy elements and strategy options in section 3, as well as the partial analysis of section 4 on how strategy options affect ISPs competitiveness, together with the ISP industry scenarios presented in this section, provide the basis for formulation of successful ISP strategies. A SWOT analysis connects the distinguishing aspects of an ISP's competitive position to the industry scenarios.

5.2 Characterisation of ISPs

The development of successful ISP strategy options must be based on the combination of all relevant information available. Our approach is to characterise a set of four types of ISPs in terms of the choices available for these ISPs and to analyse how these choices affect competitiveness. This is carried out through pairwise comparison making use of the partial analyses of section 4. Pairwise comparison of the competitive position of ISPs results in insight in the relative competitive advantages and disadvantages of different types of ISPs.

Table 6 (next page) summarises the characteristic elements of different ISPs. The pairwise comparison of ISPs is based on the assumed choices of each type in each of the 5 strategy elements.

31 See: M. Porter, 'Competitive Advantage', p. 445-481 (1985).

Type of ISP *Features*	*Incumbent telco*	*New carrier*	*New telco*	*Small, regional ISP*
Inputs	Capital intensive, (inter)national Mature technology	Highly capital intensive (advanced), (inter)national	Highly capital intensive (small, regional, national)	Less capital intensive, less advanced, mature technology
Functional value chain	ADEFGHIJ Vertically integrated	EFGJ Ownership of infrastructure	ADGIJ Only partial ownership of infrastructure	DGIJ Not vertically integrated
Product portfolio	Basic portfolio + other services	IP-transport, intranet …	Telephony/dial-up, IP-transport, e-mail, web hosting, consultancy, content	Basic portfolio, consultancy services, content
Pricing and bundling	Flat fee, bundling of access and dial-up	Usage oriented, …	Usage oriented, bundling	Flat fee, bundling of services
Market segmentation (type of customers; geographical reach)	Residential, business (SME, LNF, MNE, ISPs); (inter)national	Business (LNF; MNE, ISPs); international	Residential, business (SME, LNF); national	Residential, business (SME); regional
Examples	KPN (Netherlands), Deutsche Telekom (Germany), Sprint, AT&T (USA)	Worldcom/MCI, Qwest, Global Crossing and Level3	Mobilcom (Germany); Enertel, Telfort, Dutchtone	

Table 6: Characteristics of ISPs

5.3 Pairwise comparison of ISPs

In this section the results that are derived in section 4 are applied to the institutional types of ISPs defined in section 3.1. This is done by comparing ISPs in pairs of two. The comparison is based on the different strategies of the ISPs, that are reflected in the five elements constituting their strategies. Further, we distinguish between the different market (segments) the ISPs are acting.

For the four selected types of ISPs (telco incumbent, new carrier, new telco, small regional ISP) in principle 6 pairwise comparisons can be made. Here, as an example, we restrict ourselves to the following 2 pairwise comparisons.

1 telco incumbent – small regional ISP
2 telco incumbent – new carrier

5.3.1 Example 1: Telco incumbent – New carriers

The characteristics of a telco incumbent and a new carrier are outlined in Table 6.

5.3.1.1 Market for residential customers

With the supply of e-mail, web hosting and content, the incumbent telco addresses the market for residential customers. The new carrier does not offer his services to residential customers. Therefore, they are not competing on this market.

5.3.1.2 Market for business customers

Both suppliers are able to supply Intranets on their own networks. Therefore a cost advantage can not be derived from vertical integration by the supply supply of lines for Intranets.

(1) Competitive advantages for the telco incumbent:
On the market for business customers the telco incumbent is competing with the new telco for the LNFs and MNEs. The telco incumbent can derive a competitive advantage from the following features:

- high density of nation-wide infrastructure
- telephony service

High density of nation-wide infrastructure
The density of the network makes it possible for the telco incumbent to supply Intranets to customers independent of their location within a reasonable set up time. Even though the new carrier might be able to offer Intranet services on leased lines, it is not certain that he is capable of providing a reliable quality of service. That is because he is not able to control the network infrastructure. It is likely that this feature is of more relevance for LNFs than for MNEs, because the latter one's are often located in areas with a dense infrastructure.

Telephony service
Expertise in supplying a reliable telephony service can result in customer credits. These credits can be advantageous for selling Intranet services. The new carrier obviously cannot rely on such credits; he more or less just entered the market. To sustain this advantage the telco incumbent must provide a high quality, both in telephony and in Internet services.

(2) Competitive advantages for the new carrier:
The new carrier can derive a competitive advantage from the following features:

- high quality of international network infrastructure
- international scope of the network infrastructure

High quality of international network infrastructure
The high quality of the network infrastructure (including the amount of available capacity) makes it easy for the new carrier to dominate the telco incumbent in terms of reliability and quality of service. Especially the provision of 'bandwidth on demand' qualifies the new carrier over the telco incumbent.

International scope of the network infrastructure
The international scope of the network infrastructure of the new carrier is larger than that of the telco incumbent. Therefore, he can attract MNEs more easily than a telco incumbent. A telco incumbent must rely on leased infrastructure or has to set up new infrastructure. The latter takes a lot of time. A customer would only accept waiting if it results in a highermore reliable quality of service. (This, however, depends on other inputs, that are not necessarily related to these types of ISPs.)

5.3.1.3 Conclusion

The inputs, that is in this case the network infrastructure determines the relative competitive positions of a telco incumbent and a new carrier. The latter one generates his competitiveness from the international scope of his infrastructure and the overall high quality. The telco incumbent, on the other hand, can rely on the density of his infrastructure, especially at the national level.
In the market for business customers, both are able to supply Intranets on their own networks. The telco incumbent derives a competitive advantage from its high-density nation-wide infrastructure and its expertise in providing reliable telephony services. The new carrier may derive competitive advantages from its ability to provide high quality network infrastructure and its international scope.

A relevant distinction is that a new carrier has the newest types of lines and technology available. Thus he might benefit more from the introduction of new technologies such as WDM, Wavelength Division Multiplexing. Whether this results in a competitive advantage for the new carrier also depends on developments in demand and the requirements of available applications. When there is a surplus of bandwidth then there is no competitive advantage. However, demand for bandwidth usually follows the availability of bandwidth with some delay; when there is a surplus new applications are developed that use the available capacity.

In reality the incumbent telco also could adopt its infrastructure very quickly and the differences in competitive position due to technological changes therefore may not be that large or sustainable over time.

5.3.2 Example 2: Telco incumbent - small regional ISP

The telco incumbent and the small regional ISP are distinct in all five elements defining their strategies (see Table 6).

From the perspective of market segmentation, it is obvious that the telco incumbent and the small regional ISP do not compete on the market segments for LNFs and MNEs. In general they are only competing on the market segments for residential customers and SMEs. The competition is also limited geographically to the regional area of the small ISP.

Apart from the telephony and Intranet services that are only supplied by the telco incumbent, both types of ISPs, in general, offer the same types of services.

Nevertheless, there are other possibilities to differentiate for an ISP, as we have seen in section 3.

5.3.2.1 Market for residential customers

(1) Competitive advantages for the telco incumbent:
A telco incumbent can derive competitive advantages over a small ISP on the market for residential customers from:

- supply of telephony
- supply of content
- scale of his infrastructure for the provision of the basic portfolio
- nation-wide supply of PoPs

Intranets are only demanded by business customers and are therefore irrelevant for the market for residential customers.

Supply of telephony
The telco incumbent that offers Internet services on a large scale, has a competitive advantage over a small ISP, because of his additional supply of telephony services (dial up connection and access can be bundled) and the already established customer relation. These features reduce the transactions costs for a customer by a combination of one-stop shopping, low costs for monitoring his Internet expenses and low search costs. (On a long-term perspective the latter one cannot be that important. Once entered the Internet the customer does not face high search costs any more. That is because of the ease of searching via the Internet.)

Supply of content
Whether the supply of content is more advantageous for the telco incumbent or the small ISP cannot be stated in general (see section 4.4.4). There are a few arguments in favour of the telco incumbent. In our model, the ability of supplying attractive, well packaged and well tailored content is measured in terms of number of hits. This determines the competitiveness of a content supplier.
For our comparison we assume that both suppliers do offer content of the same attractiveness. Information on the existence of an attractive web site helps to attract customers. Since the telco incumbent has many more customers than the small ISP, he can offer this information to many more potential visitors and thus has at first stage a competitive advantage in attracting visitors. This advantage results out of information costs (transaction costs) that the customers bear when searching content. As already mentioned, they are only important in the short run. Therefore, to sustain this advantage, a telco incumbent has to provide a higher quality of content than the small ISP is offering.

Scale of infrastructure for the provision of the basic portfolio
Because of the law of large numbers and the independent usage behaviour of the customers the telco incumbent has a cost advantage over the small ISP since he is serving a larger number of customers.

Nation-wide supply of PoPs
This is important to attract customers all over the country (at low access costs: leased lines or dial up). Furthermore, this feature captures those customers that do frequently access their ISP from another area than their home area. The nation-wide distribution of PoPs makes it possible for the customer to access their ISP at local or regional rates from any place within the country.

(2) Competitive advantages for the small ISP:
The small ISP can derive a competitive advantage over the telco incumbent on the market for residential customers from *customised help desk services*.
With the provision of customised, high quality consultancy services, the customers with a strong preference for this service can be captured.[32] Small ISPs might have a competitive advantage over the incumbent telco here, since their operators usually have a high quality of IP skills. Besides that a telco incumbent usually prefers to provide standardised consultancy services. The ability to find a niche market and provide customised services successfully depends on the quality of service delivered. It is only possible for those ISPs that have enough expertise in information technology and IP.

5.3.2.2 Market for SMEs

(1) Competitive advantages of the telco incumbent:
The telco incumbent can derive competitive advantages over the small ISP on the market for SMEs from:
- the scale of his infrastructure for the provision of the basic portfolio
- standardised consultancy services
- nationwide supply of PoPs
- intranet

The scale of his infrastructure for the provision of the basic portfolio:
The advantages that can be realised on the market for residential customers also apply to the market for SMEs. Supplying the basic portfolio to *both* market segments makes it even more likely to generate economies of scale.

Standardised consultancy services:
Economies of scale in offering standardised consultancy services give the telco incumbent a competitive advantage. He is able to dominate the small ISP in price competition.

Nation-wide supply of PoPs:
Only *medium* sized enterprises demand this feature. Small enterprises are not likely to make use of this service and therefore have no willingness to pay for it. We will discuss this feature when looking at the market for LNFs.

32 Note that we assume that the likelihood of high expertise in small ISPs is quite high. This holds true especially for small ISPs that are set up by 'freaks'.

Intranet:
Because the telco incumbent owns lines all over the country, he can offer SMEs one-stop shopping for Intranet services. The small ISP has difficulty competing here, because he is not able to control the whole infrastructure (only the IP infrastructure).

(2) Competitive advantages of the small ISP:
The small ISP can derive a competitive advantage over the telco incumbent on the market for SMEs from:

- customised consultancy services

These customised consultancy services must be of high quality. Small ISPs that have a high expertise and a close distance to residential customers have a competitive advantage. This advantage holds for a niche market of SMEs with a high willingness to pay for quality of service.

5.3.2.3 Conclusion

The telco incumbent generates his competitive advantages from economies of scale that he can realise because of his large number of customers. However, he needs a nation-wide scope to serve so many customers.
The small ISPs that are characterised by high expertise can only sustain a competitive position on small niche markets. That is because of their cost disadvantages in comparison to the telco incumbents.

It is likely that end users will make agreements in advance with their ISP on how much traffic will be sent on the various QoS levels. For an ISP it is important *to manage the IP traffic in such a way that the available capacity is efficiently used and the agreed QoS is met*. Larger ISPs can more easily do this because of:

- *Law of large numbers*: if the number of customers is high, each with their own typical behaviour, than the aggregate demand can be fairly accurately estimated (the degree of accuracy is dependent on the number of customers and the diversity in demand). Moreover, by choosing the portfolio of customers such that their behaviour is complementary, an ISP can efficiently use the available capacity.
- *Offering QoS*: a larger ISP has more influence on the QoS level than a smaller ISP, because the former one has control over a larger part of the network. Thus, the range of the network is an important indicator of ensuring QoS.

Therefore the incumbent telco has a competitive advantage over the small regional ISPs, especially in the market segment of business customers which have strong preferences for high QoS. Further specification of such scenarios, analysing the interaction dynamics inherent in these scenarios and developing an instrument to support strategy development and testing is certainly one of the issues for further research.

5.4 Strengths, Weaknesses, Opportunities and Threats

This section summarises the findings of the previous sections where various business strategies for different types of ISPs were analysed. The results are mentioned as Strengths, Weaknesses, Opportunities and Threats. The strengths and weaknesses

reflect the current situation and is based on an internal analysis. The opportunities and threats relate to future developments and is based on an external analysis.
Note 1: the opportunities and threats are put together because it is usually a matter of wording that determines whether it is an opportunity or a threat.
Note 2: the difference between current situation (S & W) and future situation (O & T) is frequently arbitrary because we are (always) in the middle of a transition period.

5.4.1 Incumbent telco

The incumbent telco has several *strengths*. For example, the incumbent telco is able to offer one-stop-shopping to his customers, which may be an advantage for a specific type of customers. An incumbent telco has control over a large part of the necessary network, and therefore is able to provide a higher guarantee for QoS. An incumbent telco offers a nation-wide supply of PoPs and therefore customers only bear the local telephony costs. Furthermore, an incumbent telco faces low costs for IP-transport and thus their total costs for offering IP-services are lower. In the market for consultancy services, the incumbent telco faces increasing economies of scale because of their large number of customers in *standardised* consultancy services (and therefore they have a competitive advantage over smaller ISPs). Moreover, they are able to offer customised consultancy services with a high added value to customers that have a high willingness to pay for those services (especially larger companies). Finally, the incumbent telco is well-known by customers, partly because of their long standing supply of telephony, and therefore customers have faith in the incumbent telco; new customers on the ISP market may first consider the incumbent telco as a business partner.
A *weakness* of the incumbent telco is that they are using relatively old technology and for that matter are less suited to offer QoS. Therefore, updating the quality of their network is necessary to remain competitive to new entrants on the market for backbone capacity; that is, it is an *opportunity* to join the high technology carriers in providing QoS. *Threats* are the increased competition on the market for backbone capacity and new regulation. Together they lead to lower prices for and lower margins on IP transport.

5.4.2 New carrier

A new carrier is a backbone capacity supplier with a new and large international network. His *strenghts* lie on the wholesale market and large business customers. New carriers have a high degree of control over their network, which is useful in providing QoS to their customers. Furthermore, they are facing relatively low costs for IP-transport. A major *weakness* for a new carrier is that they are not (yet) well known (contrary to their main competitor: the incumbent telco). Therefore, customers do not easily find their way to the new carrier; the new carrier has to invest to build up ‘a name’.
A major *opportunity* for the new carrier is to face the competition on the market for backbone capacity with other new entrants on this market and with the incumbent telcos: prices for and margins on IP-transport are decreasing. Furthermore, the new

carrier should exploit his advantage of having the newest technologies for providing QoS. This will attract the customers with a high willingness to pay for quality.

5.4.3 New telco

A new telco is a nation-wide operating telco that owns part of the backbone and therefore has relatively low costs for IP-transport. Other *strenghts* of the new telco are that it has the right to interconnect with the incumbent telco and thus is attractive for customers that prefer one-stop-shopping. Further, the new telco is in a good position to make the necessary investments for expansion because usually large and financially sound organisations participate in the new telco (for example, British Telecom participates in Telfort; the ING Group participates in Libertel). Also, frequently one of the participating organisations already has a backbone infrastructure (such as Dutch Railroad as participant in Telfort). This implies that their infrastructure is relatively old but, again, the costs for IP transport are relatively low.
As with the new carrier, new telcos are not yet well known and therefore their major *weakness* is that they have to build up 'a name'. The new telco however can exploit the fact that well known organisations participate in the new telco (see above). A *threat* for the new telco is that it has to face the competition with the incumbent telco.

5.4.4 Small regional ISP

A small regional ISP offers access to customers in a particular limited region. Their *weakness* is that this type of ISP has only a few PoPs and therefore it depends on others to offer IP services, at present still on the incumbent telco. Therefore their costs for IP transport are relatively high. However, an *opportunity* to the small ISP is to exploit the decreasing costs for leasing lines (mostly due to competition on the backbone market). Another *weakness* is that the small ISP can not offer guarantees for QoS to its customers, because of their very limited control over the network.
A *strength* for most small regional ISPs is that their personnel are flexible and highly qualified. The personnel identify themselves with the organisation and therefore they are very motivated and thus offer high quality of service. Further, a small ISP is close to its customers and therefore the small ISP is able to offer flexible and customised service. A major *opportunity* then is to find a niche market for consultancy and content services. Due to its low number of customers, the small regional ISP is not able to profit from increasing economies of scale.

5.4.5 Summary of Strengths, Weaknesses, Opportunities and Threats

It is instructive to look into the strengths, weaknesses, opportunities and threats of each of the ISP-types. This provides a basis for analysing the dynamics of competition in scenarios. The results of the SWOT-analyses above are summarised in Table 7.

SWOT ISP	Strengths	Weaknesses	Opportunities and Threats
Incumbent telco	• One stop shopping • Control over large part of network • Nation-wide supply of PoP • Low cost for IP-transport • Economies of scale in standardised consultancy	• Relatively mature technology	• Provision of QoS • Join high-technology carriers in providing QoS • Increased competition in the market for backbone capacity
New Carrier	• Advanced technology • Ability to provide QoS • Low cost for IP-transport • International network	• Market entry (brand name)	• Exploit new technologies to provide QoS
New telco	• Low-cost for IP transport • One stop shopping • Investment potential	• Market entry	• Exploit new markets and technologies • Competition with incumbent telco
Small regional ISP	• Flexibility • Customer orientation	• High cost for IP-transport • Dependency on telco incumbent • Inability to gain economies of scale	• Exploit decreasing costs of leased lines • Niche markets for consultancy and content services • Competition with incumbent telco

Table 7: SWOT-results

5.5 Focussing scenarios: the role of Internet technology

ISP industry scenarios should take account of uncertainties in the external environment and consider the capabilities of the different types of ISPs to react and anticipate on these uncertainties (strategic leverage). Uncertain external factors are:

- Technology: new Internet technologies (IPv4 - IPv6, INTserv – DIFFserv, scarcity in the backbone network or in the access network);
- Regulation and policy: changes in interconnection agreements, competition policies, regulations concerning intellectual property rights;
- Market structure: new players and essential market characteristics;
- Customer needs: developments in preferences and trade-offs, pace of adoption of Internet services, penetration of services and Internet access rates.

Focusing in particular on Internet technology developments, it is clear that the impact of technology supporting QoS is a factor concerning ISP's competitiveness. In section 2, developments concerning QoS (INTserv, DIFFserv) and IP protocol developments were already mentioned. Although the developments seemed very promising, it recently turned out that there are some important limitations (scalability) of RSVP and thus INTserv, such that it will not be used in the Internet at large. However, the market

requires an immediate solution for handling QoS. This led to the development of differentiated services (DIFFserv).

In the following short analysis it is assumed that a limited set of options concerning three types of technology uncertainties are determining the strategies of ISPs (Table 8):

- QoS technologies (options: INTserv – DIFFserv)
- IP version (options: IPv4 - IPv6)
- Scarcity of transport capacity (options: backbone network – wired access network).

Uncertainties Options	QoS	IP version	Scarcity
Option 1	DIFFserv	IPv4	Backbone Network
Option 2	INTserv	IPv6	Wired Access Network

Table 8: Options for scenario development

A basic difference between *INTserv and DIFFserv* is that INTserv provides guarantees on a connection basis for individual traffic streams and DIFFserv provides probabilities on an aggregate basis. Thus, DIFFserv has a lower ambition level. An important aspect of DIFFserv is the opportunity that it provides to customers to make agreements with its ISP on the tariff and the specific pipe he will use for its traffic (associated with a different quality). The capacity of the different pipes is relatively static; that is, the capacity will not be adjusted in real time. When there are agreements in advance for a longer period between the customer and an ISP on the combination of traffic class and tariffs, then there is no *direct* price tag associated with every IP-traffic. Only *indirect* costs in the sense that a service uses a certain capacity in the pipe / for that quality. DIFFserv has much lower requirements towards accounting and billing procedures than would be the case with INTserv.

Concerning *scarcity of transport capacity*, access networks offer the local loop to the backbone. The wired access network is characterised by high cost per data unit because of limited usage, ownership by incumbent telcos and its serving mainly as access to consumers and SMEs. Aspects of the backbone network are: low cost per data unit because of shared usage, a high degree of competition (a/o Worldcom), and a strong capacity growth induced by fiber technology (WDM). Most probably, scarcity of transport capacity will be in the access network.

A likely technology scenario thus might consist of the following assumptions: DIFFserv technology will emerge as the dominant QoS solution; IPv4 will prevail during the next few years; Scarcity in the access network will be above scarcity in the backbone network. Table 9 depicts the resulting developments for competitiveness of incumbent

telcos, new carriers and regional ISPs based on this scenario. The consequences are as follows:

- DIFFserv will increase the competitive position of incumbent telcos regarding consumer markets, because of its end-to-end ownership of the backbone as well as the access network. DIFFserv will also benefit new carriers because these carriers can guarantee a high QoS for advanced services such as VPN, VoIP and VIP to enterprises. New carriers may cherrypick in enterprise markets.
- Scarcity in the wired access network will benefit incumbent telcos, because of their current ownership of the access network. It will result in disadvantages to new carriers because extra investments are required in order to guarantee full access and to decrease the risk of overcapacity. It also will provide a disadvantage for small regional-based ISPs who are fully dependent on incumbent telcos.
- IPv4 will result in a disadvantage for regional ISPs because its consumer orientation requires one address for each consumer where in enterprise markets much more data per address is transported.

Scenario Impact on ISP	DIFFserv	IPv4	Access network
Incumbent telco	**++**		**+**
New carrier	**+**		**-**
Regional ISP	**-**	**-**	**-**

Table 9: A likely scenario and its impacts on ISPs

6 Summary and further research

6.1 Summary

The objective of this research was to develop an analytical framework for developing successful business strategies for Internet Service Providers. This paper focussed on the impacts of production characteristics on costs and opportunities for service differentiation. A conceptual and qualitative approach was presented which allows for analysis of impacts of business strategies on the competitiveness of different types of ISPs.

We do not claim to be exhaustive. There are many more features of business strategies of ISPs that are relevant for their competitive position and there are also more types of ISPs. Furthermore, the model-based analysis presented here is *qualitative*. For a quantitative analysis the model should be extended and reliable data should be made available.

In spite of these these limitations, the analysis allows for a better understanding of successful business strategies.

6.2 Questions for further research

The framework and approach we developed in this report can be used in the analysis of several interesting questions:

- Given the shakeout in number of ISPs, which ISPs will form successful alliances? Should ISPs collaborate with other ISPs to increase their service differentiation or to increase vertical integration or should they merge with the same type of ISPs?
- Which ISP is able to attract catch the new entrant customers?
- What is a successful strategy for an ISP to obtain advertisement revenues?
- Can small ISPs co-exist beside big players, like telco incumbents or new international carriers? And if they can, what are their niche markets?
- Is infrastructure an essential facility in the market for Internet Services and should it be owned by the service providers?

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