

Strategic Study

New services

Strategic exploratory survey of a dynamic phenomenon

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1 Summary

In this study an analysis is made of the development and dynamics in new services. Recent years were marked by an array of new developments that undoubtedly do not pass the service sector by, and thus also affect other sectors of the economy. This pertains, for instance, to people's living- and working-related behavior, as well as to rapidly evolving technological advances. This strategic exploratory survey focuses on services that came into being not too long ago, and that form part of special trends. These services are defined as 'new services'.

Because it is not possible to cover the entire array of new services two marginal criteria were delineated within the framework of the underlying study. One criterion denotes an exclusive focus on services involving a novelty to customers, the other criterion denotes an exclusive focus on services new to the Netherlands, although there is one separate chapter about the service dynamics in the United States.

Problem definition and research questions

The key problem definition of the study reads as follows:

What exactly does the term new services entail?

On the basis of the following research questions, the problem definition will be elaborated in more detail:

1. Which force fields affect the natality and mortality of new services?
2. What dimensions of novelty may be differentiated in respect of the term new services?
3. How may a new service be defined? What are the characterizing differences between a new service and an already existing service?
4. What are the characteristics of new services?
5. What future developments may be expected in the new services arena?
6. Of what nature is the U.S. analysis of the term new services? Are there any similarities to the Dutch analysis?

The approach comprised both national and international literature surveys. In addition, several expert interviews were conducted with parties experienced in services-sector studies. Furthermore, the initial

stage of the project was marked by a brainstorm session among EIM researchers adept at service-sector studies for several years. The conceptualization of the term new services was linked to an inventory of a large array of concrete new services. Simultaneously, use was made of findings from U.S. studies into new services.

Research findings

The research is supported by an auxiliary tool employed to outline a preliminary state of affairs of (several) numbers of new (or recently emerged) services (see appendix 1).

By studying the force fields of new services it may be concluded that new services evolve within technological, social and demographic force fields. The sector encounters a severe impact from the emergence of ICT in particular. Often, the development of new services is simultaneously affected by several forces. Moreover, it proves impossible to define new services as statistical phenomena. Therefore, one should continuously consider the dynamics of the development stage of new services.

Based on three aspects, i.e. the dimensions of novelty, the life cycle of services and the service characteristics, the term 'new services' is analysed. Related to novelty, it may be concluded that the term new service may be applied to either entirely new services or to renewed services. A service is renewed if the way of service generation changed, or if it emerged as a new service stemming from a combination of already existing services. When assessing whether a service may be rated as new, the moment in time when users use, perceive or encounter that service is also crucial, although that moment does not necessarily have to match the time-span during which that service came into being. Related to the list of new services, financial services and many government services can be seen as 'genuinely new'. A huge share of services emerging as the result of developments in the ICT field do however entail renewed services, which means that not the service as such is new, but that the mode of rendering service was modified. The same can be said about the majority of personal services.

The product-life cycle is another reference point when looking at new services. The product-life cycle entails that every product encounters various phases, ranging between the time of development to the time of market 'dislaunching' (more information about this in appendix II). Following the application of the product life-cycle on services it may,

summarized, be concluded that new criteria emerge upon assessing to what degree a service may still be rated as 'new', such as:

- A new service lingers in the introduction phase and/or the growth phase of its life cycle.
A new service lingers in that period if and when not all potential consumers do not yet utilize the new service, and there are still new elements/characteristics that may be added to the service, and if new distribution channels may be added.
- A new service is not marked by a fixed volume of repetitive purchases as yet.

Another way of studying new services is looking at the degree to which the characteristics of new services differ or show resemblances to the characteristics of existing services. These characteristics are intangibility, production and consumption may take place at the same time and same location, and the direct interaction between provider and customer. It appears when looking at new services, that primarily the characteristics of dependence on location and time is affected by changes. Because of ICT, production and consumption do not have to occur simultaneously, although warehousing may be affected to some extent. Besides, in many cases these services cease to demand direct interaction. The characteristics of existing services are however still applicable to new personal services.

The U.S. also refers to the commonly understood 'CHIP' framework of Coproduction, heterogeneity, intangibility and perishability. A useful analysis of these characteristics, by comparing consumer participation with the ability to control inputs, is given by the Goodwin and Radford model. The model demonstrates that a wide variety of interactions is possible in various circumstances. Of the four models presented, only the 'therapy model' (strong interaction) can be seen as a description of the situation in 'old' services, especially personal services like psychotherapy.

The U.S. conceptual scheme categorizes services as knowledge-based, knowledge-embedded and knowledge-separated. The three categories form a continuum showing the dynamics of service transitions in an economy. Knowledge-based services entirely depend on the knowledge holder to deliver the services. This service type is extremely personalized and labour intensive. These services may evolve into services in which some of the knowledge becomes embedded in a product that makes the services accessible to more people. At this stage, the consumer must develop some knowledge in order to use the service, but need not go so far as to become an

expert. Finally, services reaching the knowledge-separated stage, the service may become accessible to customers with very little knowledge. A good example is the automatic teller machine that has replaced many bank tellers. A service in this stage, spawns additional services of a technical nature that attach to knowledge-based services. For an ATM machine, these are design, manufacturing, software production, maintenance and repair services. These services, however, also are undergoing evolution into knowledge-embedded and knowledge-separated.

The criteria for defining new services, can be derived from the types of changes which occur as services make the transition from knowledge-based to knowledge-embedded and then to knowledge-separated. These are changes in technology, in provider/customer interactions and changes in service dimensions. Based on these changes, a new service can be defined as one that represents movement along the continuum or is catalyzed by movement along the continuum.

Integration Dutch analysis and U.S. analysis

The integration of the Dutch part and the U.S. part shows that many new services can be seen as knowledge-embedded services. These are mostly renewed services. New services can also be knowledge-based. Most of the services in this cluster are services that usually arise from recent cultural, social and economic forces. The final cluster of new services, knowledge-separated services, are new services that emerge from technology (IT) that was not available in the past. Combining the two approaches, new services may be described as follows:

- New services are services that are new or renewed to the (potential) customer
- Services can be considered new as long as they are in the introduction phase or in the growing phase when looking at the development in time
- New personal services are mostly knowledge-based
- Renewed services are often knowledge-embedded
- New services that emerge from new technology can often be seen as knowledge-separated services.

2 Introduction

2.1 Research framework

Similar to other highly developed economies, the Netherlands economy is marked by an increasing service intensity, as illustrated by the large share of the service sector in employment and value added in entire private enterprise. The number of enterprises rose 1.5 times during the 1987-1997 span. Remarkably, the vigorous growth of the share of service industries was primarily due to a substantial rise (from 17 to 30%)¹ of the number of enterprises in business services, while the share of personal services also increased considerably. The increasing significance of the service sector is, for instance, illustrated by the share of services in employment growth, and the increasing technology- and capital intensity of the service sector. Though technology- and capital intensity were traditionally considered a privilege of the industrial manufacturing sector – whereas the service sector was rated comparatively labour-intensive – the heretofore prevailing image is nevertheless gradually fading.²

Recent years have been marked by an array of new developments that undoubtedly do not leave the service sector unaffected, and thus also affect other sectors of the economy. This pertains to for instance people's living- and working-related behaviour, as well as to rapidly evolving technological advances. Owing to these developments, the service sector seems to change its nature: Supply of and demand for other types of services have come into being; and many already existing services have materialized in different ways than previously. These developments might even account for the materialization of new markets and sectors. The underlying strategic exploratory survey focuses on services that came into being not too long ago, and that form part of the afore-mentioned trends. These service types will now be defined as 'new services'.

An illustration of a new service is provided below.

In a 24-hour economy, dual-income earners hardly find time for domestic chores. Not to worry! Leisure time may be bought through new services. Increasing numbers of entrepreneurs perceive the market gap termed 'convenience'. Upon payment, domestic chores may be performed by the recently established *Gemak Dient De Mens* enterprise.³

1 EIM, *Oplevend ondernemerschap in Nederland*, Zoetermeer, 1997.

2 TNO, *Kennis voor de dienstensector*, TNO-beleidsstudies en advies, Amsterdam, 1995.

3 R. Schlikker, Huishoudelijk werk de deur uit, in: *FEM*, nr. 5, p. 42, 1998.

2.2 Definition of the term new services

In view of the all-embracing nature of the service sector, the entire array of new services can not be covered by the underlying study. Therefore, prior to selection, two marginal criteria were delineated that new services within the framework of the underlying study have to meet. One criterion denotes an exclusive focus on services entailing a novelty to consumers, the other criterion denotes an exclusive focus on services new to the Netherlands. An outline of both criteria is provided below.

Services new to consumers

The survey primarily focuses on services that are new to consumers. According to the classification by Browning & Singelman, these entail final services in particular – i.e. services rendered directly to consumers –, occasionally termed personal services. Obviously, and simultaneously, these often also entail services being employed by enterprises; the underlying study does however focus on the question whether a service is new to consumers. The relative significance of services not directly linked to industrial manufacturing production may not be underestimated. Because of increasing welfare, and the linked shift in demand patterns, demand for final services is generally on the rise.¹ Besides necessitating a separate study, it has proven complex to cover in the survey all new services that are being rendered in and among enterprises. Individual consumers are hardly aware of these new services. Opting for services new to consumers by no means implies that any survey of the number of services new to enterprises will produce less interesting results as, on the contrary, demand for services primarily destined to be rendered to other enterprises and institutions has risen. According to the service-sector classification by Browning & Singelman, the latter entail producer or intermediary services.² The increased significance of these services stems from the production of ever more complex goods, and demands a higher input and variety of services.

Services new to the Netherlands

Applying a geographic delineation of the term new services has proven crucial, as it is not feasible to survey the development of new services while covering a larger geographic entity than the

1 TNO, *Innovaties in diensten*, position paper, TNO-beleidsstudies, 1993.

2 In addition to personal services and producer services, Browning & Singelman's classification also differentiates distributive and public services. Browning & Singelman's classification of the service sector contains but one of the classifications possible, and is based on the output-destination criterion or the type-of-customer criterion. Other classification criteria include, for instance, those differentiating by dominant inputs, by type of activities or by basis of funding.

Netherlands. Any larger geographic entity might easily produce an unsurveyable aggregate, while repeatedly having to examine whether a service new to the Netherlands is also new for Europe or even the entire world. Chapter 4 does however focus on service dynamics in the United States.

2.3 Relevance to SME

Trends in the service sector as outlined above will considerably affect both demand and supply in SME.

The shift from manufacturing industry to service industry in recent years serves as an illustration of the demand side effect. Increasing consumer demand for services aside, consumer preference focuses on differentiated products often with a brief life cycle. Due to their flexibility, small enterprises in particular may respond more easily to changing consumer demand.

Simultaneously, supply side developments affect SME. Primarily, these entail technological advances. Firstly, ever advancing computer technology is now within SME's reach, enabling the affordable automation of production, administration and logistics on an ever smaller scale. Secondly, due to improved and less expensive means of communication, SME have gained access to markets previously the exclusive domain of large enterprises.

As a consequence to the afore-mentioned trends, small-scale entrepreneurship has enjoyed increasing attention for several years. Frequently, it becomes apparent that flexible and innovative SME are of crucial significance to economic development.¹

2.4 Research objective and problem definition

Objective of the study

The underlying strategic exploratory survey focuses on new services, while emphasizing the objective to gain more knowledge about the term new services. A conceptual framework is set up to incorporate characteristics, definition and delineation of the term new services. The survey also attempts to provide more knowledge as to the development of new services in the United States.

1 Tweede Kamer, *Werk door ondernemen*, 24 243, nr. 1, 1994-1995.

Problem definition and research questions

The key problem definition of the study reads as follows:

What exactly does the term new services entail?

Based on the following research questions, the problem definition will be elaborated in more detail:

1. Which force fields affect the natality and mortality of new services?
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4. What are the characteristics of new services?
5. What future developments may be expected in the new services arena?
6. Of what nature is the U.S. analysis of the term new services? Are there any similarities with the Dutch analysis?

2.5 Main outline of research methodology

Research methodology

The approach comprised both national and international literature surveys. In addition, several expert interviews were conducted with parties experienced in services-sector studies. Furthermore, the initial stage of the project was marked by a brainstorm session among EIM researchers with several years of service-sector experience. The conceptualization of the term new services was linked to an inventory of a large array of concrete new services.

Simultaneously, use was made of findings of U.S. studies into new services. Researchers from the New Jersey Institute of Technology and the University of Brooklyn, respectively, furnished their views in respect of developments of new services in the U.S., the results of which are recapitulated in this report.

Report set-up

Following the introduction in chapter 1, the force fields where new services develop are narrated in chapter 2, which outlines major environmental factors in economic, social, demographic and technological areas. Chapter 3 focuses on the term new services, while furnishing an initial framework to conceptualize the term new services (Which dimensions play a crucial role in this respect? What charac-

teristics may be attributed to new services? In what way do new services differ from existing services?).

Next, chapter 4 recapitulates the contribution by U.S. researchers, who portray a continuum characterizing many service industries, based on the degree of technology application and the know-how users need before utilizing that service.

Lastly, chapter 5 provides a synthesis comprising an analysis of the previous chapters, and focusing on the issue as to whether it is possible to identify differences and resemblances in service trends between the United States and the Netherlands. The synthesis also elaborates on the feasibility of follow-up studies.

Follow-up research

As stated above, the underlying study is of an exploratory nature, and should produce initial knowledge about the emergence and development of new services. The study may serve as a basis for follow-up research on the implications of the emergence of new services. Follow-up studies may for instance focus on various aspects of new services, such as the development of employment due to the result of the emergence of new services, the consequences for educational levels and impediments to the emergence of new services. In addition, more in-depth international comparative surveys may be carried out. In view of the impact of services-sector developments on small and medium-sized enterprises, SME may be regarded as an interesting arena to effect follow-up research.

Coaching and supervision

The project was implemented under the supervision of a reference group, comprising the following parties:

- Mr W.J. Boersma, Netherlands Ministry of Economic Affairs
- Mr T.J.A. Dunnewijk, Netherlands Centraal Plan Bureau
- Mr T. Elfring, Erasmus University Rotterdam.

The first stage of the project included an internal brainstorm session, incorporating contributions by the following parties:

- Mr C.A.W. Bertens
- Mr C. Koning
- Mr A.F.M. Nijsen
- Mr A.R. Thurik
- Mr A.R.M. Wennekers.

3 Force fields of new services

3.1 Introduction

Economic developments are affected by force fields comprising an array of demographic, technological, economic, social and legal trends and factors. The dynamics of these force fields provide leeway for the emergence of new or the rediscovery of 'vanished' activities, and may also affect other trends or initiate them. The emergence of new services is affected by such force fields, too. Knowledge about these force fields provides tools to allocate the development of 'new' services within dynamic environs. Therefore, first the force fields of new services are outlined; next, chapter 3 elaborates on the term 'new services'.

3.2 Force fields

Technology¹

The development of information and communication technology (ICT) generates a myriad of changes that severely affect the service sector. In particular, technological developments affect the way in which services are offered (i.e. the process side). ICT application enables 'stock-pile production' of services, as well as dislinking the delivery of services from any time- and location dependence. Consequently, direct interaction between producer and consumer may often be omitted. Besides, information can be more easily transferred, thereby diminishing the necessity of physical task concentration, as illustrated by increasing teleworking possibilities for instance.

Many new services that have emerged as a result of technological advances might, probably, very soon be outdated in the wake of new technological innovations, take for instance the facsimile machine which is increasingly more often being substituted by Internet applications (e-mail). However, it is clear that the impact of such technology is huge, also for the creation and integration of other new services. The bankcard seems to be a good example. Originally this card was used in a very basic way; getting money by putting the card in an ATM. Nowadays there are many other ways of using this card, like cash dispenser, electronic payments, car parking by bankcard.

¹ J.M.H. Kok, *Nieuwe vormen van arbeid: potenties voor nieuwe werkgelegenheid*, Bundel Arbeidsmarktdag, 1998 (forthcoming).

The above does not however imply the isolation of services 'capacitated' through ICT applications. Often, they are linked to social factors. Trends such as the 24-hour economy, increasing numbers of dual-income earners and individualization create the need for comfort, convenience and speed.

Through Internet use and an array of chip applications, consumers are increasingly being spared the trouble of obtaining specific services. Large-scale utilization of voice mail, at the expense of the answering machine, is not exclusively rooted in the higher user-friendliness of voice mail as such; it is also strongly affected by promotion campaigns that explicitly draw the attention of consumers to the free-of-charge nature of the service, and to the fact that users may activate voice-mail access only via their own telephone connection.

Economy

Economic trends affect the development of new services in various ways. On the one hand, financial grounds are practically always likely to underpin the decision to render any new service. On the other hand, consumers are likely to make use of new services as long as financial feasibility is ensured. Substantial use is, for instance, made of personal services; the rationale for this market's existence is presently primarily found in the fact that there are many dual-income earners who can afford personal services. Besides, due to being dual-wage earners, they have little time and constitute the par-excellence cluster demanding personal services. Should consumers have command of lower disposable incomes, the personal-services market will probably shrink. This situation might arise if the number of dual-income earners declines due to social factors, or in the event of less favourable economic conditions.

Economic forces too may also spur the emergence of new services. Globalization, for instance, generates demand for rapid international information flows, while the knowledge economy stimulates a high degree of new education-/training schemes and courses.

Social sphere

As repeatedly illustrated above, social forces play a major role as regards the development of new services. Factors such as individualization, rising numbers of dual-income earners, the importance of efficient use of leisure time, the flexibilization of labour and the 24-hour economy are players of significance in this respect, as these factors account for the emergence of huge numbers of new services. They create demand for services in the realm of convenience, com-

fort, speed and customization. The rising number of dual-wage earners, for instance, demands more personal and social services of a different nature, e.g. in the realm of child-care/nursery facilities, domestic chores, (home-delivered) instant food and extramural activities.

Legislation

By passing or reforming legislation, the government also affects the emergence and development of new services. Often, new-service development is coupled with influence exerted by other forces, as for instance illustrated by the relation between environment protection and 'green investment funds', the relation between demand for domestic workers and the emergence of the 'legal domestic helper', and the relation between the 24-hour economy and the relaxation of legislation governing business hours. In addition, there is leeway for innovation in services because the government 'retracts', and leaves the field of task-assuming to private enterprise, as for instance illustrated by private 'arbo-services' that assume those tasks previously effected by such public enforcement agencies and the GMD.

Demographic factors

Amongst other factors, the ageing population and the transition to a multi-cultural society play a role in the demographic force field. The ageing population and the simultaneously occurring individualization generate both a greater and other-quality demand for health care. We observe a transition from a society where health-care providers had/have a say to a society where decision-making power is increasingly assumed by clients themselves who demand customization. Service-rendering has shifted from supply-oriented to demand-oriented, as for instance illustrated by the fact that the elderly wish or have to remain at home for a longer period, and that health-care services have to adapt and match that demand.

Again, the transition to a multi-cultural society generates differing needs. Everyday matters, such as food & beverages or hairdressing aside, this also holds for the expectations of ethnic minorities in respect of supportive aid/assistance, for instance. As these expectations do not necessarily match the traditional health care rendered, supply in this respect should be adapted.

Combination of forces

As has been previously explained in this section, new services often emerge within the dynamics of various forces. The case below may serve as an example here.

*Supermarket cash counters to perish!*¹

One factor dominating the future of supermarkets is the increasing time pressure encountered by consumers (...). This implies renewed attention for neighbourhood minimarkets supplying a convenience product range, for supermarkets maintaining longer business hours, and for supermarkets offering home delivery of goods and meals. Changing consumer demand and permanently changing trends in the technological arena and in the domain of legislation (inc. the relaxed business-hours act) continuously force supermarkets to modify their business formulae.

Within 15 years, check-out and payment procedures will have changed considerably. The cash-out point will perish, and will be substituted by gates that will scan goods bearing a radiographic chip. Cash-out staff will thus increasingly assume the role of hosts, and will supply customers with information.

Many supermarkets will increasingly gain greater market shares by supplying non-food goods, and by the creation of an in-store catering facility. Service-rendering too will be improved, while customer-service cum information counters in supermarkets will play a key role and evolve in some type of 'shop-in-the-shop'.

Summarizing, it may be concluded that new services evolve within technological, economic, social and demographic force fields. The sector encounters a severe impact from the emergence of ICT in particular. Often, the development of new services is simultaneously affected by several forces.

Moreover, due to continuously emerging developments within force fields, it has proved impossible to define new services as statistical phenomena. Therefore, one should permanently consider the dynamics of the development stage of new services.

1 J.F. Suyver, H.J. van Driel en W.J.P. Vogelesang, *De toekomst van de supermarkt* (HBD) 1998.

4 New services

4.1 Introduction

The considerable array of studies examining the service sector (services and service industries), has generated a large amount of sectoral definitions, terminology and classifications. Since the service sector encountered many developments over the past years, however, existing literature on the subject is not necessarily valid as regards the term new services.

Following the outline of force fields affecting new-service development in the previous chapter, this chapter focuses on the definition of the term new services.

The narration in this chapter is supported by an auxiliary tool employed to outline a preliminary state of affairs in several numbers of new (or recently emerged) services. This state of affairs may serve as a base to conceptualize the term new services. (See section 1 for a detailed outline.)

Section 2 comprises an analysis of the term new services based on three aspects, the first aspect being an examination of the dimensions of novelty. A (mere) description of the term 'new' serves a point of departure in this respect, and as a base for further elaboration. The second aspect entails the time dimension of new services, and pertains to a comparison with the product life-cycle. In view of the myriad of reference points as regards new services, this comparison is provided in a separate section. Section 5 examines to what degree the characteristics of already existing services are applicable to new services as well.

Existing literature on services and the service sector will be referred to where useful and applicable.

4.2 Preliminary account of new services

Differentiation of new services

To gain more knowledge about new services, the underlying survey attempts to differentiate various categories of service that bear common characteristics. This section comprises an initial onset in this respect.

Obviously, many services recognized (rather often) during the past years only, provided the basis for the underlying strategic exploratory survey. Appendix I comprises a list of new services thus identified.¹ These new services are classified according to categories based on the force field affecting service development. The first two categories are driven by specific forces, i.e. the technological force field and the social force field, respectively. The third category comprises the remainder of services that develop as a consequence of interaction between several forces. The classification should be regarded as an initial one, illustrating the types of services covered by the underlying strategic exploratory survey, and should serve to provide improved insight into the dimensions and characteristics of new services. The classification reads as follows:

- a. Services having the common characteristic that they emerged or changed due to technological advances. ICT is accountable for the majority of these developments.
- b. Services having the common characteristic that they are the result of the favourable income situation of many private households, so enabling a large group of consumers to utilize these services. This category also comprises services linked to the multi-cultural society.
- c. Financial services, environmental services and government services.

Ad a

New services emerging as a consequence of ICT applications may be divided as follows:

1. Services offered via the Internet, or via other electronic media (e-commerce via Internet, Internet provider, electronic railway schedule)
2. Services focusing on novel means of payment on the basis of chip applications (PIN-code phone calls, new cash-out and payment procedures in supermarkets)
3. Services that could not be rendered without the existence of ICT (home-tagging of convicts, cellular phones)
4. Services made possible by technological advances other than in the ICT field. Many of these services are evident in the medical world (surrogate motherhood).

¹ Obviously, the account is by no means complete. The list does however provide an outline of the various types of new services, and of the diversity of their materialization.

Ad b

New services emerging due to higher welfare and an increasingly multi-cultural society may be divided as follows:

1. Services rendered to consumers at home (odd-job services, organizer, home health-care for ill and incapacitated persons)
2. Extramural consumer services, focusing on speed and convenience (instant meals in supermarkets, valet service and haulage services)
3. Services marked by individual customization (personal training, exclusive customized travel itinerary)
4. Services linked to the multi-cultural society (Euro-hairdressing saloon, temporary employment agencies catering for non-Dutch speaking residents).

Ad c

This category comprises an array of new financial services, environmental services and government services.

A huge number of new services is on offer by the financial world, such as swaps, a myriad of investment funds and mortgage-saving schemes. Up to some several years ago, only enterprises employed the above services; in recent years, however, considerably many private persons have been found to buy these types of financial services. One of the major characteristics of financial services entails the constant interaction between the emergence of a new service and legislation reform by the government.

Through legislation, supplemental decrees or deregulation, the government exerts substantial influence as regards the emergence of services, as for instance illustrated by green electricity and the emergence of the working conditions act. Several services – such as car-sharing agents and the so-called *retourrette* – also focus on upgrading environmental quality.

4.3 The term new services

4.3.1 Introduction

As such, the term ‘new service’ does not prevail in the service sector. Neither is it a term that may be easily defined on the basis of objectively assessable criteria, nor a term marked by clear definition. It is, therefore, essential to identify those characteristics that determine the difference between a new service and an already existing service.

Based on three aspects, i.e. the dimensions of novelty, the life cycle of services and the service characteristics, the following section provides a more detailed analysis of the term new services.

4.3.2 Dimensions of novelty

Definition of the term ‘new’

Following the outline of service types covered by the survey, this section focuses on the question as to what degree services may be rated as ‘new’. The following expressions may be applicable to the term ‘new’¹:

- Recently emerged, produced, designed
- Applying new methods
- Not previously perceived, encountered or utilized.

The afore-mentioned expressions indicate the applicability of the term ‘new’ in various contexts.

Recently emerged, produced, designed

This expression narrates the most literal meaning of the word ‘new’. Not-existing before, it is recently available. In respect of new services, this implies that a new service entails a service rendered for the first time, thus not existing before.

Applying new methods

The attribute ‘new’ illustrates that the service already existed, but is now rendered by different means, so it is called a ‘new’ service. As for new services, this implies that they are rendered by a different method than before. To differentiate these new services from genuinely new services, the former will be termed renewed services hereinafter. Renewed services may entail a combination of already existing services, or a combination of products and services that render a new service, or the method of service-rendering. These two types of renewed services are delineated later.

- Novel combinations of products and services, or of already existing services

The combination of services is rated as a type of service innovation abundantly found at present, one example being the pizza-delivery service. Although pizzas have been around for a long time, and delivery service is not a novelty, the synergy of home-delivery pizzas is a genuine novelty. Center Parcs serve as a more complex example of a combination of services. Years ago, services rendered by this enter-

¹ Selection derived from Van Dale Dictionary.

prise consisted of supplying a holiday bungalow, whereas nowadays this concept has changed into an overall formula where customers gain access to many services, such as a swimmer's paradise, restaurants, baby-sitting, sport courses and video entertainment.

By no means, however, may all existing services be linked and rendered to customers without restrictions. Once ordered, a pizza must be delivered while still hot, at the agreed time and address, upon which direct payment must be effected. As for our Center Parcs example: Customers need to know what types of services may be utilized, and which services are included free of charge. This necessitates adequate co-ordination among the various divisions, while varying services should be organized according to new structures.¹

- Mode of service rendering

Presently, many services are rendered in different ways than before. An array of examples can illustrate this. Though ordering books as such is not a novel phenomenon, book ordering via the Internet entails a novelty. Cash may be withdrawn from banks at any time; the renewing factor in service-rendering by banks being that this may be effected almost world-wide (at by-the-road ATMs). Rather than the service itself, the procedure of service-rendering has changed in the latter example, as is also definitely the case as regards services obtained through ICT applications.

Besides, many personal services are rendered using different methods than previously. The domestic servant was for instance substituted by the legal domestic help, and the odd-job man by the home service. Grounds for these changes are often rooted in professionalization, possible because more people want and are able to make use of these types of services. Cases where modes of service-rendering differ substantially from previous methods entail elements of service dynamics, and may thus be covered by the underlying study.

Which services are new, and which services are renewed?

When identifying 'genuinely new' services, the first to emerge are those in the realm of financial services, as these services were not previously rendered. The same holds for many government services. In addition, services enabled by ICT applications may also be rated as new, such as the Internet-Café, virtual intermediaries and home-tagging of convicts. A major share of services emerging due to developments in the ICT field do however entail renewed services, i.e. not the service as such but merely the mode of service-rendering has been modified. Furthermore, the majority of personal services rank under renewed services. Often, these entail combinations of already existing services, such

¹ T. Elfing, *Innovatie en concurrentiekracht in de dienstensector*, Rotterdam, 1997.

as meal-delivery services, the Mc-Drive, mail-order pharmacies and individual funeral services. There are also personal services that existed before but are now rendered using an entirely new formula, as for instance illustrated by the legal domestic helper, the organizer and self-development courses.

Not previously perceived, encountered or utilized

The definition of the term 'new' indicates that the service existed but was not recognizable as such (by everybody). In the new-service context, two correlated aspects emerge from this definition. First, it appears that there may be a time period between the absolute time ($t=0$) of a service emerging, and the moment ($t=1$) that service is employed, perceived or encountered. The second aspect pertains to the behavioural attitudes of users. Upon utilizing, perceiving or encountering the service, users rate that very service as new. This moment is different in time for every user, and thus symbolizes a subjective term. Both aspects are essential elements of the analysis of the term new services, and are closely correlated to the question as to when a service may be rated as 'new'.

Making use of the Internet serves as an adequate example in this respect:

Developed in the 1950s as a computer network for academics and the military, it was not until 1983 that – also because of the rising popularity of personal computers – the Internet evolved into a means of mass communication, boasting approximately 50 million users world-wide by 1997.

Summarizing, it may be concluded that the term new service may be applied to either entirely new services or to renewed services. A service is renewed if the way of service generation has changed, or if it has emerged as a new service stemming from a combination of already existing services. Upon assessment as to whether a service may be rated as new, the moment in time when users use, perceive or encounter that service is crucial, although that moment does not necessarily have to match the time-span during which that service came into being.

4.4 Comparison with the product life-cycle

4.4.1 Introduction

Section 3.3 illustrates that the moment a service may be rated as new can be affected by various factors, such as consumer perception and way of launching by producers. In respect of the underlying study, it is important to identify criteria determining at what moment in time a service is still new, and to ensure the objectivity of these criteria to any degree possible. When identifying these criteria, major tools for comparison are furnished by the theory governing the product life-cycle.¹ This theory may serve as an instrument to identify criteria determining the moment in time a service may be rated as 'new'. The underlying section outlines the product life-cycle's fields of interaction applying to new services.

A comparison with the product life-cycle furnished new reference points applicable to the term new services. The product life-cycle is deemed a general theory applicable to many fields, and in view of the increasing interrelation between the manufacturing industry and service industries, it appears useful to apply this theory to the service sector, too. So far, not many studies have been carried out into the life cycle of services. Barras is one of the few researchers who focused on this subject, albeit that he focused primarily on the innovation process within the service sector.² Once a service has managed to establish a market position, that very service also links up to the regular life cycle. Barras developed the 'reverse product-cycle' theory, adopting the principle that innovation processes in the service sector materialize in a reversed order to that of normal product life-cycles. This theory pertains to the difference in sequence between process innovations and product innovations. In the event of service-related innovation, process innovation occurs first, followed by product innovation, while the reverse order holds for product innovation.

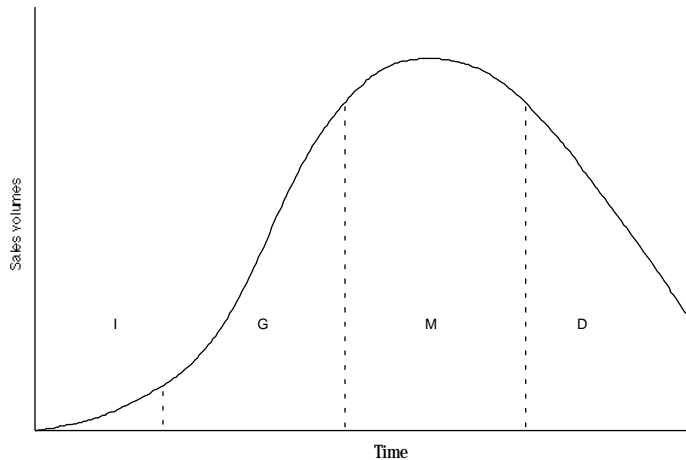
4.4.2 Application of the product life-cycle to new services

As illustrated by chart 1, one basic principle of departure as regards the product life-cycle entails that, from its moment of market-launching, every product passes through the following phases: introduction, growth, maturity and decline.

¹ Appendix II provides an extensive outline of this theory.

² TNO, *Innovatie in diensten*, position paper, TNO-beleidsstudies, 1992.

chart 1 'S-shaped' product life-cycle pattern



Legend: I= Introduction; G= Growth; M= Maturity; D= Decline.

Based on the theory governing the product life-cycle, the following two interfaces between the life cycle of products and the life cycle of services may be identified:

1. A comparison with the development stage of a service
2. A comparison between the type of product and the flow of (repeated) sales.

Ad 1

Comparison with the prevailing (S-shaped) product life-cycle illustrates that the term 'new' is still applicable during the launching- and growth stages. Throughout the launching phase, many products are marked by retarded growth. In many cases, initial buyers of new products stem from higher income clusters. Rapid market acceptance occurs. Throughout the growth phase, simultaneously, during this time-span, producers attempt to add new elements to their products, to penetrate new market segments and to identify new distribution channels. Because of these strategies, many consumers encounter the new product for the very first time in this phase. The latter also constitutes the crucial difference compared with the maturity phase, during which period the product gains acceptance by virtually all potential buyers.

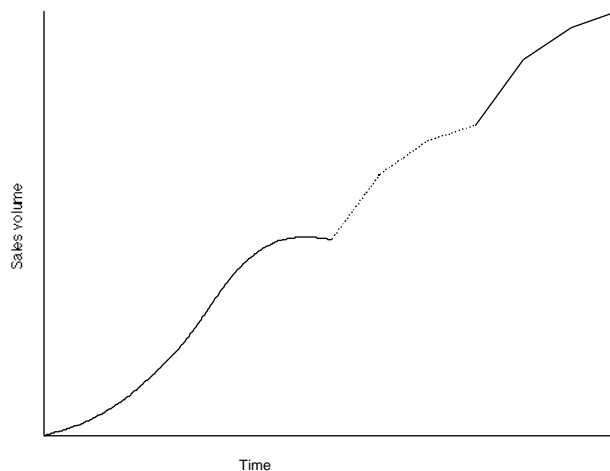
May the above theory be applied to new services?

The list containing the new services identified illustrates the existence of many services not yet utilized by all potential customers, for

instance ordering or buying goods via the cash dispensers (ATMs). Practically all potential customers have however already effected PIN-code payments or frequented a Mc-Drive. Simultaneously, there are still many services waiting for new elements, distribution channels or markets to be added. At present, various services do not focus on specific target groups. Cellular phones, for instance, are the domain of business people; many personal services primarily cater for dual-income earners. One sure-fire opportunity entails a larger extent of distribution channels supplying other target groups.

Another possibly applicable life-cycle pattern as regards new services is the 'scalped' pattern (see chart 2). This pattern emerges due to constantly discovering other qualities of a product, to new methods to use a product or to attract consumers. Sales volumes may thus capitalize on these positive stimuli, already materializing in many renewed services. Although the service as such is not new, the mode of service-rendering entails a novelty.

chart 2 'scalped' pattern



Causes of slow growth of services

The theory governing the product life-cycle furnished reasons causing the slow growth rates marking many new products. These reasons are rooted in both producer-related factors as well as consumer-related factors. For the major part, this holds for new services, too. Where service providers are concurred, one significant effect was that the promotion of, and information provided about the new service was inadequate. In the case of ICT-related services, new services may still be hampered by technical bugs, or may not be so user-

friendly as yet. As regards consumers, it may be true that these were informed about the new service at too late a stage in the cycle. Besides, consumers may show initial resistance to the use of a new service, i.e. they have to surmount an initial threshold. This holds for both ICT-related services and personal services. Consumers may, for instance, deem it unnecessary to order a book via the Internet if they can obtain the same book from the bookshop.

Ad 2

The product life-cycle differentiates between one-time purchased products, infrequently purchased products and frequently purchased products. Infrequently purchased products include substitution purchases (such as washing machines), while the term frequently purchased products applies to repeated purchases. Once a stable volume of repetitive purchases has been established, the term new products loses its justification. As regards services, too, infrequently purchased services may be differentiated, such as a mortgage-savings scheme, Center Parcs vacations or supplementary insurance cover. There are also large numbers of frequently purchased services, such as info services via the WWW, meal-delivery services and PIN-code payments. The 'fixed volume of repeated purchases' criterion appears to be an adequate supplement to the afore-mentioned criterion, since once in a while many customers are likely to effect book purchases via the Internet, or are likely to approach a pizza home-delivery service. If subsequent repetitive purchases are not rapidly effected, the service has not reached the maturity phase as yet. Conceivably, there may never be any repeat purchase of a new service; that service will thus not survive. Average failure rates of new services amount to 18%.¹

Summary conclusions

Following the application of the product life-cycle to services, it may as summary, be concluded that new criteria emerge when assessing to what degree a service may still be rated as 'new'; viz.:

- A new service lingers in the introduction phase and/or the growth phase of its life cycle. A new service lingers in that period if and when not all potential consumers utilize the new service as yet, and there are still new elements/characteristics that may be added to the service, and if new distribution channels may be added.
- A new service is not marked by a fixed volume of repetitive purchases as yet.

¹ This percentage amounts to 40 for consumables, and to 20 for industrial products. (Source: Ph. Kotler, Principles of Marketing.)

4.5 New services – new characteristics?

4.5.1 Introduction

The following section elaborates as to what extent the characteristics of new services differ or show resemblances to the characteristics of existing services. Given the huge diversity of services within the service sector, and in view of constant developments therein, many definitions and interpretations of the term services exist. A single, clear definition is therefore not possible. One approach, often adopted in literature to detail services, involves the identification of characteristics. The advantage of this approach lies in its sector-crossing nature, as service characteristics are to some extent applicable to all service-rendering enterprises.¹ This approach deals with qualities exclusively applicable to services, not to products. The underlying section provides an outline of major service characteristics as found in literature, followed by an assessment of to what extent these characteristics may still be applied to new services.

4.5.2 Characteristics of existing services

In general, three categories of service characteristics may be differentiated²:

1. Intangibility ('services are products one can't drop on one's feet')
2. For the major part, production and consumption are effected simultaneously
3. Service may emerge only in the event of direct interaction between provider and customer.

Categories 2 and 3 illustrate that service-rendering entails a specific relationship between consumers and producers. Due to the simultaneity of production and consumption, no third person or service may act in an intermediary capacity. Once more, this is based on assuming the necessity of direct interaction, with *mutual trust* being a must. Simultaneously, the intangibility criterion entails that services are of an abstract nature and may not easily be tangible. Many service dimensions, such as quality, emerge only during the process of production and consumption, causing a comparatively high rate of insecurity among customers in respect of to what extent the service will meet expectations. Once more, the reliability of a service, and therefore the management task to diminish customer insecurity as far possible, appears to be a significant aspect.

¹ T. Elfring, *Innovatie en concurrentiekracht in de dienstensector*, 1997.

² W. van der Aa en T. Elfring, Innovaties en strategieën in de dienstensector, in: *Dynamiek in de dienstensector*, Rotterdam, 1998.

Simultaneity of production and consumption generates a capacity issue, as *warehousing is (practically) not an option*, and because (the transition of) a service *depends on location and time*. An aircraft taking off with empty seats indicates loss of production. Capacity utilization in service industries changes constantly, and entails a major success factor in service-rendering. Many service-industry related innovations focus on the optimization of capacity utilization.¹

4.5.3 Applicability of characteristics to new services

This sub-section examines whether the characteristics originally attributed to services may also be applied to new services.

Intangibility of services ('services are products one can't drop on one's feet')

Similar to 'existing' services, the intangibility criterion appears to be significant for new services, too. Owing to the emergence of ICT, and future rising numbers of virtual services, the number of products previously tangible and now supplied with an intangible nature seems to be increasing, as not all possibilities of that technology have been fully exploited as yet.

Direct interaction and mutual trust²

As regards direct interaction, a differentiation may be made between those services utilizing and other services not using ICT applications. ICT enables a service to be rendered without any direct interaction between provider and customer. The element of mutual trust, however, that should always prevail when demanding and supplying services, is even more important for such services. Consumers will only dare to use a cash dispenser (ATM) provided that the amount requested is indeed dispensed, the PIN-code remains secret, and the PIN-card is not damaged, and the correct amount is debited from the account. Moreover, direct interaction in these service types was often substituted by *indirect* interaction, effected via one or more media. The Internet also furnishes possibilities to effect communication in an interactive manner, as illustrated by e-commerce. Other Internet applications, such as net-surfing, are not interactive.

As regards personal services, however, direct interaction is often required; i.e. there is interaction between communication, agreements and actions between both parties. The simultaneity of pro-

¹ T. Elfring, *Innovatie en concurrentiekracht in de dienstensector*, 1997.

² W. van der Aa en T. Elfring, *Innovaties en strategieën in de dienstensector*, in: *Dynamiek in de dienstensector*, Rotterdam, 1998.

duction and consumption is thus maintained, the capacity-utilization issue thus remains.

Zero warehousing

In contrast to many personal services, those services enabled by technological advances severely affect the possibility to neutralize the capacity-utilization issue in the service sector. The result expected from ICT applications by and in the service sector requires the ex-ante effectuation of tasks (which may be rated as some type of warehousing) to (at least partly) neutralize dependence on time, storage capacity and location.

However, the substitution of services by goods may even serve to diminish the capacity-utilization issue as, for instance, illustrated by the introduction of domestic appliances and the accompanying self-service concepts.¹

Services' dependence on time and location

Regarding new services' dependence on time and location, here again a differentiation may be made in services related and those not related to ICT in one way or another. As stated above, one of the characteristics of ICT applications entails the near automatic 'transferability' of services.

In particular, this holds for those services that face the highest degree of restriction due to the geographic and time dependence between production and consumption. Presently, in an increasingly rising number of services, it is possible to separate production from consumption. Consumers may currently utilize many services without leaving home.

The varying intramural personal services will however remain dependent on location, similar to many other personal services, such as services in restaurants & hotels. Presently similarly location-dependent are visits to a physician and attending educational courses. The location dependence of the latter two examples has, however, already been reduced in some cases, given their additional facilitation through the Internet.

Differences as opposed to goods

As one of the service characteristics, the intangibility criterion suggests a clear distinction between service and product, while in fact gradual transition occurs. The cosmetics industry, for instance, lingers somewhere in the middle of that continuum, the sector man-

¹ M.W. de Jong, *De dienstensector: transacties in transformatie*, 1991, p. 6.

ufactures industrial products marked by the importance of intangible elements. In addition, services in trades and hotel & catering also assume a medium position in that continuum, as tangible elements are of major importance here. Current developments account for the fact that the distinction between goods and services is increasingly less unambiguous. The degree of tangibility of a service may change when being affected by technological advances, as for instance illustrated by the telephone directory that can be substituted by a CD Phone Directory or by a website.¹ Besides, production processes are increasingly marked by the clustering of goods and services, in the automobile industry for instance. Far from being a mere car factory, the automobile industry harbours an entire service range, photographers and marketing managers, etc., selling a product called 'car'.

Summarizing, the following may be concluded.

- Applicability of characteristics to new services

When examining to what extent the characteristics related to 'existing' services also apply to 'new' services, it appears that primarily the characteristic of dependence on location and time is affected by changes. Thanks to ICT, production and consumption do not have to occur simultaneously, although some extent of warehousing may be required. Besides, in many cases, these services cease to demand direct interaction. The characteristics of existing services are however still applicable to new personal services.

1 M.W. de Jong, *De dienstensector: transacties in transformatie*, 1991, p. 6.

5 New services: An analysis of service dynamics in the U.S.

5.1 Introduction

In the previous section an analysis was made of the development in new services in the Netherlands. The analysis of a large number of new services showed that new services in the Netherlands can be roughly divided into three different categories. The three categories can be defined as follows: IT-driven new services, socio-economic developments driven new services (personal services) and other new services, for instance services related to new financial products and public/governmental services. The next aspect that was studied was when is a new service really new and how we can draw a line between 'old' services and 'new' services. 'New' means for instance 'not seen and/or experienced' before (by a large group of customers). Also, there are combinations of 'old' services that can be seen as renewed services, for instance the delivery of meals at home.

The product life-cycle (PLC) was introduced to have a tool to make an analysis of the degree to which consumers are aware of or actually use the new service. Individual consumers will use a new service early, late or even never (for instance because of the need of difficult IT skills).

When looking at the general characteristics of services we have seen that in IT-driven new services, direct interaction between the producer and consumer of the service is no longer necessary, for example in electronic-commerce services. IT made it possible to divide production and consumption. Sometimes a certain amount of stock is needed: part of the service can be 'defined' or 'created' in advance through IT. At the moment of delivery only the last few data have to be given and the service is delivered. In fact nowadays people do not have to leave their homes anymore to be able to buy these types of new services. This implies that the consumer of IT-related services has to have all necessary information about the way of buying the service himself.

In the U.S., the subject of new services has also been studied. In this chapter a paper prepared by Judith Kirchhoff, Bruce Kirchhoff and Steven Walsh will be presented. The paper gives insight into (the development of) new services in the U.S. In particular the aspect of

knowledge that is required for service delivery and/or service consumption of new (IT-driven) services is analyzed in this paper.

5.2 Services in a modern economy

5.2.1 Introduction

At the turn of the 20th Century, most industrialized societies in the world experienced economic vitality driven by the phenomenal growth of manufacturing. Agriculture was rapidly becoming mechanized, thereby releasing a large workforce to become engaged in manufacturing. By the 1920s, the majority of Americans were employed in manufacturing.

One hundred years later, near the turn of the 21st century, most advanced economies are experiencing economic growth driven by services. Over the last fifty years, the mechanization that reduced employment in agriculture evolved into automation that has reduced employment in manufacturing. And, services have grown to absorb the workforce released from manufacturing in the second half of the 20th century, just as manufacturing grew to absorb the workforce released from agriculture in the first half.

Currently, three-fourths of U.S. gross domestic product is produced as services delivered by almost 80 per cent of the total workforce. Yet, this is probably an understatement of the impact of services. Government statistics with their awkward, archaic definitions do not capture the service components within manufacturing firms. For example, in the U.S., customer-service employees in manufacturing firms are classified as manufacturing employment. Yet, the expanded definition of manufacturers' responsibility for product quality and performance (warranty requirements) has led to the recognition that customer service can be a major strategic advantage for a manufacturing company. This has caused a major increase in service personnel counted as manufacturing employees.

But, it is difficult to define and identify services because unlike products, some aspects of services are intangible. We cannot count the number of service units delivered in the way we count the number of television sets produced. Nor can we measure the cost of distribution per unit as we do when calculating the shipping cost of a TV. And quality is an ephemeral characteristic. We have no way of adjusting prices of services for changes in quality as we have for quality improvements in TV sets. Instead, we are forced to measure

inputs (number of employees) and revenues knowing neither the real economic nor social value added by a service. This means that calculations of service productivity are crude and potentially misleading. The absence of accurate productivity measurement is well known by economists, and has in fact been labelled as the 'X-Factor' by Allen Greenspan (source: Business Week, August 31, 1998b) in order to explain why economic growth appears to be exceeding the traditional economic calculation:

- Growth in GDP = Growth in work force * Growth in labour productivity.

Currently, in the U.S., economic growth exceeds this, and Greenspan adds the X-Factor to acknowledge that productivity is growing faster than the crude measure we have been applying.

Greenspan (source: Business Week, 1998b) argues that the application of technology to services both within the manufacturing and service sectors has greatly increased labour productivity. Yet, the growth of technology in services carries the same social concerns as those that occurred in manufacturing during the 20th century. Technology increased manufacturing productivity at a greater rate than overall manufacturing output so that manufacturing employment declined between 1970 and 1990. However, so far, the expansion of services has grown much more rapidly than the productivity growth rate, so employment is increasing. And this is likely to continue as technology's application in services creates the need for new services. For example, technological advances in medicine create demand for more medical services to improve the quality of life.

Clearly, technology is a major factor in the future of services. Yet, little has been done to reorganize the way society looks at the services and technology interaction. The purpose of this paper is to examine technology's impact on services as an evolutionary phenomenon so as to chart the past and use it to develop a conceptual scheme that fits the future. In so doing, we can isolate the factors important to public policy and provide guidance for sustained economic and employment growth into the future.

We begin this paper with a review of the literature citing the characteristics of services that identify their uniqueness and focusing on factors that show the impact of technology. Next, we develop a conceptual scheme that captures the nature of the evolutionary phenomenon dominating the service/technology interface. Finally, we

extrapolate this evolution to show the important implications for public policy.

5.2.2 Services as a separate industry sector

Services have been the focus of considerable attention in academic and practitioner literature for many years. As evidence of this, an extensive bibliography is attached. In recent years, much of this literature has attempted to relate the services definition to models of products to compare or contrast services with products in such subjects as marketing, distribution, quality control, etc. However, fundamentally, services are different in many ways.

CHIPs

Several authors have focused on classifying these differences as CHIPs: co-production, heterogeneity, intangibility, and perishability (Rathmell, 1966; Rathmell, 1974; Bateson, 1977; Shostack, 1977; Zeithaml, Parasuraman *et al.*, 1985; Edgett and Parkinson, 1993).

- *Co-production*: Service providers deliver services to consumers of services simultaneously so that the consumer is part of the production process. In other words, service production cannot exist unless both a provider and a consumer are involved.
- *Heterogeneity*: Providers of services interact with the consumer of the services as a routine part of service delivery. As such, the service delivered takes on a unique character as the provider responds to the individual interests and needs of the consumer.
- *Intangibility*: Services are not physically measurable outputs as are products. We cannot touch, weigh or determine height, width and length of services as we can with products. Services are felt or experienced by the consumer even if the service may not be intellectually understood. Intangibility makes quality measurement and control difficult.
- *Perishability*: Services are not physical objects and as such cannot be stored or inventoried. Services exist only when a provider and consumer interact simultaneously. The presence of one without the other results in no service delivery. This means that scheduling dominates the operation of any service organization. Proper scheduling is critical to the successful operation of a service organization.

Interactions

Upon reflection, these are obvious characteristics of services although the degree of each component of CHIPs may vary depending on the service provided. Goodwin and Radford (1993) offer a use-

ful analysis of these degrees by comparing consumer participation with providers' ability to control inputs. They lay out these two dimensions as a two-by-two matrix. The model of low provider control of inputs and low consumer participation is called the **movie model**. Consumer entry is unrestricted at the movie, and consumers are passive recipients of entertainment. The **retail model** demonstrates low provider control and high customer participation. The authors assume a self-serve retail store where the provider places the goods on display and consumers actively seek, find and buy the goods.

The **industrial model** displays high provider control of inputs and low customer participation. The authors assume a product manufacturer's customer-service organization where consumers ask for assistance (think of your copying machine), then the service representative checks the problem definition and the actions necessary to find a solution. Lastly, the **therapy model** describes high provider control and high customer participation. Psychotherapy is a good example where both the therapist and the consumer are actively involved.

Goodwin and Radford's (1993) model is an interesting attempt at organizing provider and consumer interactions and demonstrating that a wide variety of interactions is possible in different circumstances, even though services are 'consumed' in each case. One overlooks the simplicity of the models because they provide a stimulus towards comprehending the complexity of service interactions.

Where, when and how

Further complexity is revealed as one looks at the where, when and how of consumer and provider interactions. Gummesson (1993) suggests that the location of interactions can be at the provider's or consumer's site, or at a remote site facilitated by telecommunications. The hours of interaction need to suit both provider and consumer. And there must be security and privacy for both. Distortions of these rules of interaction will result in low-quality service. This conceptual scheme leads directly to a recognition of why Internet's 'electronic commerce' services such as retail sales, customer assistance, consumer finance, software updates, etc. are such a booming component of today's economy. Internet services meet Gummesson's requirements for a convenient site, at any hour of the consumer's choice, with reasonable privacy for the interaction. The privacy issue currently dominates discussions of the Internet's 'electronic commerce' because it is the one weak link since security is not yet guaranteed.

Service quality

Since services are intangible, quality cannot be measured as it is for manufactured products. Intangibility presents major problems for quality measurement and control. At best, service quality is a measure of expectations of and perceptions by providers and consumers regarding the interaction. Measuring expectations or perceptions alone provides inadequate quality assessment. Several models of service quality have been published in literature. Of particular importance are the models of V.A. Zeithaml, A. Parasuraman and L. L. Berry (1985), and Gronroos (1990) as modified by Gummesson (1993).

The Zeithaml *et al.* model (1985) describes the conditions that create consumer expectations and perceptions, and compares these to the conditions that create the service delivery. Consumer expectations are driven by a combination of personal needs, past experiences and communications with others. Consumer perceptions are directly related to the service delivery as it is compared with expectations. This model accepts the conclusion that even the highest-quality services can be perceived as poor if expectations are inconsistent with the delivery. At the same time, a service provider's management has perceptions of customer expectations that are used to specify the service content. If these perceptions differ from the consumers' expectations then the service quality will not be satisfactory to the consumer.

The model of Zeithmal *et al.* (1985) lists the dimensions of quality and clearly demonstrates the practical complexities attendant on quality measurement and control based upon perceptions and expectations in the delivery of services. In fact, in a later paper V.A. Zeithaml, A. Parasuraman and L.L. Berry (1990) expand this model to add a list of service-quality dimensions. These are:

- Tangibles – physical appearance of facilities, equipment, personnel and communication materials
- Reliability
- Responsiveness
- Competence
- Courtesy
- Credibility
- Security
- Access
- Communication
- Understanding.

The model of Zeithaml *et al.* (1985) is quite complete and demonstrates the complexity of delivering services where consumer perceptions of quality are paramount. This latter statement is confirmed by Cronin and Taylor's (1992) empirical research that shows service quality is a contributor to consumer satisfaction, and satisfaction affects purchase intentions. But, service quality is not as effective in determining purchase intentions as is satisfaction. Perceptions and expectations yield consumer satisfaction, and satisfaction dominates purchase decisions.

The Gronroos-Gummesson model (Gummesson, 1993) examines the inter-relationships between components of services. It proposes that quality of service emerges from design, production, delivery and relational aspects of service. These aspects interact and are dependent upon technical and functional quality specifications. The combination of the six aspects results in an image and experience of the consumer as well as shaping the consumer's expectations. In this way, then, the service provider affects the consumer's perceptions of service quality. This model is more theoretical than the model of Zeithaml *et al.* (1985) but adds perspective to the overall understanding of services.

Alternatives to CHIPs

Lovelock and Yip (1996) offer a different view of services based upon their observations that the service environment has changed radically with the changes in communication technology. They describe services with characteristics based upon the nature of the output. They categorize service operations in three broad categories: **people-processing**, **possession-processing** and **information-based**. **People-processing** services involve actions on the consumers in person. Consumers are part of the output of the production. Examples are passenger transportation, psychotherapy, lodging, etc. **Possession-processing** involves tangible actions on physical objects to improve their value such as auto repair, freight transport, equipment maintenance, etc. The physical objects are parts of the outputs, but people are not. Information-based services involve collection, manipulation, interpretation and transmission of data to create value such as legal services, real-estate services, brokers of all types, insurance, etc. Here, little consumer involvement is required. Note that the conceptual CHIPs scheme assumes that people are actively involved in all services. However, Lovelock and Yip remove this assumption from their model. Co-production is neither required for possession-processing nor information-based services. Neither of these face the

problem of perishability since the output of these services can be stored for later recall. Services need not be heterogeneous, especially in telecommunications where dialling a number is carried out uniformly by everyone, including computers.

Early recognition of machines

Lovelock and Yip (1996) were not the first to observe the rise of machines to perform services. In 1978, Thomas noted that many services were impersonal actions by machines upon objects. Thomas suggested that the way to manage a service was to define the relative equipment versus people involvement in the service delivery. Subsequently, Collier in 1983 and then in 1985 argued that service automation was a rapidly growing part of services of all kinds. He notes the use of Automatic Teller Machines (ATM) as a central example. There are many other literature citations that address the growing use of machines in delivering services.

Basically, the concept of services has expanded to a very complex multidimensional model of interactions among providers (people and machines) and consumers (people, objects and machines). Furthermore, rarely are services a single category or type but involve some complex sequence of different categories of service. For example, an auto repair appears to be a people/machine provider acting on an object or machine. However, the entire sequence of service begins with the telecommunication of data (making an appointment to obtain the service), followed by a person-to-person (CHIPs) interaction to define the service required, followed by a person/machine to object service (repair the auto), followed by a person/machine to person service (pay the bill). Which of these services is critical to quality performance? All of them. Currently, researchers refer to this as a service bundle.

5.2.3 Technology's impact on services

Within the last ten to twenty years, it has become apparent that the rapid growth in application of technology has impacted upon services (Morone and Berg, 1993; Alic, 1994; Hayes and Thies, 1991; Quinn, Baruch and Paquette, 1988; Vitale, 1986; Berg, 1973). Technology is defined as the set of skills, expertise, know-how and organization of work (Berg, 1973).

The rising cost of knowledge workers has driven up the cost of labour for services. Thus, technologists have focused on developing products that provide services without human interaction. Examples abound in the U.S. literature on technology's effect on services,

banking (Vitale, 1986; Morone and Berg, 1993), health care (Schooleman, 1993), education (Thukral, 1995; Lin, 1995; Lee, 1995) and customer service of manufacturing firms (Kupfer, 1998). None of the classification systems described above capture the phenomenal impact of technology on services and the nature of evolution of services from human-based to technology-driven product and/or machine-based providers.

One of the reasons is that service technologies have emerged as major sources of competitive advantages for many firms. For example, Cisco Systems Inc. have established Internet communication for both sales and customer service. In 1997, Cisco's Internet sales reached \$ 5 billion in equipment, over half of its total sales. Furthermore, they estimate that they would need 1,000 additional engineers to provide after-sales service to these customers if it were not for their computer-automated service system accessible over the Internet. Cisco believe that their Internet systems give them a significant cost- and service advantage over their competitors (source: Business Week, August 31, 1998c).

Thus, the subject of technology and strategic management is widely discussed but the emphasis in most such discussions is upon the technology itself and/or its development, not its effect on services. Yet the vast majority of the technology in the news media today is directed at services. This is not surprising, because the vast majority of overall production and consumption is services.

In a 1997 working paper, McDermott, Kang and Walsh (1997) make a major leap in conceptualization by classifying services according to their technology content. However, rather than attempting to measure technology directly, they approach it indirectly by examining the extent to which the knowledge that is required for service delivery is vested in the human provider or the technology of a machine. They classify **knowledge-based** services as those services in which the majority of customer value is provided by the knowledge of the person providing the service (e.g. teaching). **Knowledge-embedded** services are those where the customer value is added in the system that provides the service. The knowledge they refer to includes technology – i.e. the set of skills, expertise, know-how and organization of work. They argue that services with a substantial product component have the service value that consumers seek embedded in knowledge that is in the product. Services with a pure or human interaction component have the consumer value vested in the professional knowledge of the provider.

They present their conceptual scheme as a two-by-two matrix with product component and pure human services as one dimension and knowledge-based and knowledge-embedded as a second dimension.

They provide examples in each of the four quadrants. Pure services in a knowledge-based service are services such as teaching and professional services. Product component knowledge-based services are services such as computer-aided design where the machine adds considerable value but its value cannot be realized unless a knowledgeable person interacts with the customer who operates the machine. Product component knowledge-embedded services are services where the person interacting with the technology is merely an extension of the knowledge (technology) possessed by the machine. Their example is fast-food restaurants. To the extent that machines produce the food, the example is correct. The last quadrant is pure services with knowledge-embedded. They use the example of Federal Express Corporation where the technology of package delivery is heavily embedded in computers that schedule and route the packages. However, the delivery personnel are a critical component of both delivery and pick-up, with personal knowledge that is crucial to satisfying customers.

McDermott, Kang and Walsh (1997) present a workable and important conceptual scheme for classifying services by recognizing the way technology is forcing evolution upon services. Although not mentioned by these authors, Federal Express have embedded considerable knowledge in their computers over time. It was not always this way. When FedEx began service in the 1970s, FedEx did not have the computerized systems it relies on today. A large share of the value added derived from human procedures that were carefully developed and co-ordinated by human beings. Furthermore, part of FedEx's current competitive advantage is their ability to offer customers Internet package tracking, Internet pick-up service, and Internet confirmation of package delivery, complete with a picture of the recipient's signature. These services could not be done by human beings under any circumstances. Technology at FedEx brings higher-quality services at lower cost – this is the competitive advantage. Thus, FedEx have experienced, no, have diligently pursued, the use of technology to evolve their systems from human knowledge-based to knowledge-embedded.

5.2.4 Technological evolution

It is apparent that technology is driving the evolution of services away from the traditional CHIPS model (co-production, heteroge-

neous, intangible and perishable) into a much more technologically complex condition. Technological complexity, however, is transparent to the consumer so the resulting systems are more effective in meeting consumer expectations and generating consumer perceptions of quality. The CHIPs model is not completely foresaken; it continues to appropriately describe personal services as delivered today. Legal services, medical services, barbershops, etc. still fit the CHIPs model.

However, given the cost of knowledge workers and the problems of defining and delivering quality services, technology offers the service professions an opportunity to reduce these problems. And, many service providers have adopted technologies that have evolved their services from human-provider dependent to machine dependent. McDermott, Kang and Walsh (1997) recognized this but they do not recognize that some services can and have fully embedded knowledge in the machines. For example, the bank ATM requires no human-provider involvement at all in order to perform its teller service functions. Thus, to properly foresee the future of services and explore the public-policy implications of that future, the McDermott, Kang and Walsh (1997) conceptual scheme needs to be converted to a continuum from knowledge-based services to service without any human interaction. This latter stage we shall call *knowledge-separated*, and we shall describe it in chapter 4.9.3.

5.3 A dynamic framework for understanding

5.3.1 How services operate in an economy

As described in the previous chapter, the literature on services fairly consistently defines services as consisting of four dimensions: co-production, heterogeneity, intangibility and perishability (CHIPs). These dimensions have been examined from various perspectives, combined to develop insights and identify strategic or operating implications, but rarely are they challenged as incorrect. In other words, they stand as the 'givens' of services.

If we look carefully at the real world of services, however, it becomes apparent that the dimensions of services apply, not totally, but 'more or less'. For example, consider the banking industry. Historically, banking was a service that met the CHIPs definition. There was co-production because banking services were rendered when customers entered the bank and conducted their business with a bank teller or

loan officer. Heterogeneity was apparent because, although all transactions involve the movement of money, each customer may want a different type of movement. Thus, the transactions were customized to meet the customer's needs.

Intangibility was a dimension of the service in the sense that the perceptions of the bank teller and customer defined to a considerable degree, the service. That is, the service consisted of the knowledge held by each participant, the time and energy used to complete the transaction and its respective participants' evaluation of the transaction's quality. Perishability was apparent in the fact that the bank must be open for business if services are to be delivered. However, if the bank is open with tellers and loan officers available for transactions but no customers wish to use them, then the services are wasted. They cannot be stockpiled for use at another time.

Today, much of banking works very differently. Teller/customer transactions have been replaced by ATM machines and debit cards. Loans are often negotiated using fax machines and computer contact through the Internet rather than face-to-face transactions. Account-status reports are available instantaneously by computer whether or not the bank is open for business. Some banks have gone as far as to initiate a service charge for dealing directly with a bank teller.

What has occurred in this transition, we argue, is that the original 'service' of banking has evolved through technology to a service no longer characterized by the conceptual CHIPs scheme. Co-production no longer applies because the service transaction no longer requires the bank teller or any human being to meet with a customer. Heterogeneity applies to some degree because customers still want services customized to their particular need. However, the customization has been embedded in the product components (computers and computer software) by providing a variety of options designed to handle the majority of customer interests. The possible responses are now codified in a set of procedures that can be completed without personal interaction.

Technologies that eliminate co-production also alter the dimension of intangibility, making the service a function of the customer's interaction with the machines that replace the bank's teller. The knowledge required to deliver the service has been transferred to the transaction machines. The customer's knowledge of how to use the machines to complete transactions is all that is necessary, and this is rudimentary since the machines have a user-friendly communication system.

The final dimension of services, perishability, continues to exist but to a lesser degree. If the machines are not operating, transactions cannot be completed. Obviously, excessive down-time of the machines would eventually discourage customers. On the other hand, with today's highly reliable machines, the services are seldom missing and in fact are inventoried in the machines awaiting the next customer, 24 hours a day.

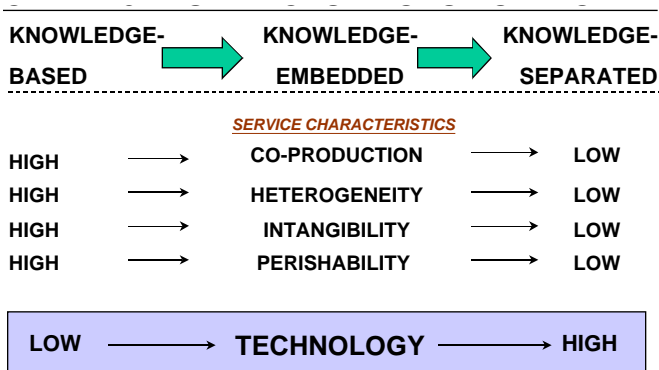
The transition of banking from personal interaction to technology-driven machines as described above does not make banking anything other than a service industry. The reason is that banks still exist to serve customers' financial needs. The customer does not walk away carrying a product that requires no further interactions with the bank. Customers still need to deposit and move money around in self-specified ways. Thus, changing the way the service is delivered does not change the fact that a service exists.

Our point is that understanding the technological evolution of service industries over time enhances our understanding of an economy's functioning and helps us to enact policies to facilitate economic vitality. As a means to that end, in this chapter, we map services as an evolutionary continuum from knowledge-based to knowledge-embedded to knowledge-separated and then use the conceptual CHIPs framework to differentiate industries by where they lie along the continuum. Once the continuum is specified, it is possible to identify economic policies that will facilitate firm growth and employment, thereby ensuring a society's economic vitality.

5.3.2 The service continuum

The proposed continuum configures services as shown in chart 3. On the left of the continuum, one finds knowledge-based services, and on the right, one finds knowledge-separated services. Knowledge-embedded services lie between the extremes. The definitions of knowledge-based and knowledge-embedded services are drawn from McDermott, Kang and Walsh (1997). The definition of knowledge-separated, the connecting logic described here and the discussion of implications are provided by these authors.

chart 3 services evolution model



Knowledge-based services

Knowledge-based services indicate services in which customer value is provided by the knowledge of the person providing the service (McDermott, Kang and Walsh, 1997, p. 13). Knowledge-based services depend upon the knowledge and skill of the service provider and are characterized by a high level of co-production. That is, the provider-customer transaction is personal and labour-intensive. These services are often called ‘personal services’.

Examples of knowledge-based services include teaching, psychotherapy, legal, accounting and other types of consultation, hands-on services like dentistry, physical therapy, physician diagnosis and prescription cosmetology, massage and personnel recruitment. Other kinds of personal services, like computer technical support, television, appliance and automobile repair, also are knowledge-based although they involve products that are used by customers, not customers themselves. Still others, like pet grooming or house cleaning, are knowledge-based although the knowledge involved is a skill.

Many knowledge-based services also exist within non-service organizations. They include staff functions such as human resource management, quality control, administrative support, financial management and marketing. It is notable that we tend to incorporate these services in the definition of the organization’s consumer focus. That is, if the organization manufactures products, all of its personnel are considered to be manufacturing employees. If the organization provides services, all of its personnel are considered to be service personnel. To truly understand services in the economy, we would have to determine how many are employed in services *within* manufacturing firms as well as in service organizations.

Knowledge-based services also have a high level of heterogeneity, that is, services must be customized to the individual needs of customers. A doctor prescribing physical therapy for a patient will specify exactly what the therapist should do for that patient. Each woman who goes to the beauty shop wants her hair cut in a particular way. Knowledge-based services also are characterized by a high degree of intangibility; that is, services are perceived on the basis of how they are delivered because what is delivered remains relatively undefined. For example, a physician's services may be described in terms of 'office visits' that result in 'tests', 'diagnoses' and 'prescribed treatments'. But the service is actually the process of consultation between physician and patient that yields these outputs. The patient describes problems, and the physician forms and tests hypotheses about the symptoms until a diagnosis is reached. Then the physician prescribes treatment, and the patient leaves the physician's office motivated to comply with the physician's prescriptions.

Finally, knowledge-based services are highly perishable because the knowledge, time and energy of service transactions cannot be stored for future use. Services not delivered are services wasted. As noted in the previous chapter, it is possible to determine a capacity of knowledge-based services based on reasonable assumptions about delivery and consumption.

Knowledge-embedded services

Knowledge-embedded services, according to McDermott, Kang and Walsh (1997, p. 14), are those services where the customer value is provided by the automated system delivering the service. In knowledge-embedded services, the knowledge and skill of the provider has been designed into a system of delivery that may be elaborate or simple. McDermott, Kang and Walsh (1997) mention fast-food restaurants and delivery services such as FedEx as examples of knowledge-embedded services. To these, one might add travel services, automobile and equipment rentals, and the Internet, lawn- and garden services, or home products and remedies that substitute do-it-yourself for the services of a professional. For example, travel services begin with the purchase of a ticket that can be purchased on a computer through the Internet. However, the actual travel requires the use of a vehicle (plane, train, boat, bus, etc.) driven by a trained professional. Some or all of the professional's knowledge-based services involve knowledge-embedded products. The pilot follows a navigation route defined by instruments and computers in his cockpit. The railroad engineer follows signals along the track and instructions received by radio.

In the United States, one might argue that health-care services are becoming more knowledge-embedded, to the degree that diagnostic tools are used to form diagnoses, and diagnosis-based treatment regimes are mapped as clinical guidelines and critical pathways. Hair colouring, cosmetics and over-the-counter drugs also are examples of knowledge-embedded services where the knowledge has been transferred into a simple-to-use product requiring only modest knowledge of the customer.

The use of some kinds of computer software requires considerable user expertise. Thus, for example, computer-aided design (CAD) accomplishes as much for the design expert as for the customer (McDermott, Kang and Walsh, 1997, p. 15). CAD provides the expert with the ability to create a library of designs (reducing perishability) and increases the accuracy of the drawings, while speeding up the design process for the customer. The Internet, on the other hand, is quite user-friendly, although 'behind the scenes' lies an elaborate system of delivery transparent to the user but requiring substantial technical support, support that is a knowledge-based service.

Knowledge-embedded services can be distinguished from knowledge-based services using the CHIPs framework. In terms of co-production, knowledge-embedded services require less involvement between the service provider and customer; that is, they are less personal than knowledge-based services are. Because knowledge-embedded services have been developed into a system, they are less heterogeneous than knowledge-based services. For example, to purchase a plain hamburger at McDonald's requires extra time (slower service) because the system is set up to prepare sandwiches according to the 'average' customer's preference.

Regarding intangibility, knowledge-embedded services are more tangible than knowledge-based services because there is a product component to the service. The product component may then become the focus of perceptions. For example, if a woman should dye her own hair and the colour comes out wrong, she is likely to blame the product or her colour selection, not the hair-colouring service that the product is 'delivering'. With respect to perishability, the knowledge-embedded service is less perishable because the product component remains, often allowing the customer to 'store' the service for future use. In the hair-colouring example, it is not necessary to use the hair-colouring product immediately after purchase. The woman can buy the colour and store it for a significant time before using it. In the CAD example, the library of designs made possible by CAD

becomes both a tangible and stored version of the designer's expertise that can be modified for future application. Thus, knowledge-embedded services are more tangible and less perishable than their knowledge-based counterparts.

Knowledge-separated services

Knowledge-separated services are the third category of services. Knowledge-separated services are those in which the customer value is provided by the knowledge of the customer in acquiring services. That is, the knowledge component has been embedded in the product component in such a way that the only knowledge necessary to receive the service resides with the customer. The knowledge-separated service requires few or no transactions with a human provider except through the product component. The customer needs only to know how to receive the service by using the product component. Interactions with the service provider occur only if the product component fails, and the nature of the transaction between customer and service provider is problem-solving.

Examples of knowledge-separated services range from telephones to electricity to ATM and machines. A good example is the automatic teller machine that has replaced most bank tellers. The knowledge of the teller is now fully embedded in the ATM. The 'user-friendly menu' in multiple languages provides complete instructions so any one can operate the machine. Customers receive teller services without ever contacting another human being. As the example shows, ATM machines are knowledge-separated services that are so transparent to the customer that the customer is virtually unaware that service is being provided.

These services make use of technology called 'electronic data interchange' (EDI) wherein computers communicate with one another without human involvement. Another example from the U.S. health-care system is the use of EDI for verifying benefits, billing and paying. When a patient enters a health-care provider's domain, the provider enters the patient's identity card information into the system for verification of the patient's benefits. After services have been delivered, codes for the services rendered are entered, the payer's computer verifies the fee for the service and electronically posts the dollar amount to the provider's bank account, all without human interface. Therefore, for most service providers, the continuum in chart 3 represents a transition from labour-intensive to labour-free service transactions.

In terms of the CHIPs framework, knowledge-separated services are low to very low in co-production; provider-customer transactions are in the form of problem identification and correction (troubleshooting), not routine transactions (receiving and paying the bill). The skill level of the provider in transactions with the customer is relatively low, usually clerical in nature. That is, the provider takes information and transfers it to the proper place for action (e.g. schedules the repair). It should be noted that the transactions between provider and customer about knowledge-separated services are actually demand signals for related knowledge-based services. As noted above, repair, maintenance and technical support are knowledge-based services. Thus, knowledge-separated services generate the need for related knowledge-based services, 'closing the loop' so-to-speak, back to the beginning of the continuum.

When a service is knowledge-separated, it is homogeneous rather than heterogeneous. Even the luxury of a customized version of the standardized product (a plain hamburger at McDonald's) is not possible. That is, you cannot use an ATM machine to cash a check. By turning the service transaction into a completely specified routine that does not require labour, flexibility (and heterogeneity) has been sacrificed.

With respect to intangibility, the knowledge-separated service, like its knowledge-embedded counterpart, is tangible in the sense that the product component provides customer access without the constraints involved in person-delivered services, whether knowledge-embedded or knowledge-based. For example, to receive either psychological counselling or a hamburger from McDonald's, one must want the product when it is available (during business hours). One can use the ATM machine at any hour of the day or night. The expectation issue associated with intangibility is still relevant, however, in the same way as for the knowledge-embedded service. If the ATM machine or cellular phone is not working, the customer is not satisfied.

The perishability of knowledge-separated services is about the same as for knowledge-embedded services. The product component contains the capacity of services to be delivered and is always ready and available to deliver services, so in that sense they are 'stored'. However, customers must access the capacity of services for them to be used or consumed. So, services not used represent lost (perishable) capacity. One example is an ATM machine in an isolated area where no one uses it. Move the ATM machine to a busy location

where many can access its capacity and it is likely to be used. It should be noted that the cost of lost capacity in the ATM machine is minimal and fixed as compared to the cost of lost capacity of a knowledge-based professional whose salary must be paid whether or not customers are served. The professional's salary continues whereas the cost of the ATM machine is fixed at the cost of its production and operation. This is one strong incentive for turning knowledge-based services into knowledge-separated ones.

Now that services have been arrayed on the continuum in chart 3, defined and explained using the traditional CHIPs framework, we can turn to the dynamics of services by asking an obvious question: 'Do all services move along the continuum from knowledge-based to knowledge-separated?' Once this question has been answered, we can address a third question, 'How can the continuum help us to understand our service economy?' The answer to the third question provides a foundation for policy recommendations.

5.3.3 Dynamics in the continuum

The presentation thus far clearly assumes that services make the transition from knowledge-based to knowledge-embedded to knowledge-separated. Our examples demonstrate that many services make the transition. But many are not all. It can be argued that some services will always be knowledge-based. For example, how can the medical or legal profession ever make the transition to knowledge-embedded or knowledge-separated services? Will we not always need to meet face-to-face with these professionals to define our need for services and determine how to fill that need? Will students ever be taught completely by computers without teachers to guide them? While we can bottle hair colour, can we package haircuts so that we do not need a beautician or barber to style our hair?

We begin the discussion of dynamics in the continuum with a proposition and a caveat. The proposition is that all services tend to make the transition from knowledge-based to knowledge-embedded to knowledge-separated. The caveat is that services do evolve towards knowledge-separated, more or less, fast or slow, depending upon the nature of the service and the ability of service providers to protect themselves against the transition or to invent new services to justify their existence. That is, the tendency toward transition can be constrained by the nature of the service and the power and inventiveness of providers in constraining the tendency. We first address the dynamics of evolution and then the constraints.

Dynamics of evolution

The process of evolution from knowledge-based to knowledge-embedded to knowledge-separated occurs in much the same manner, and for the same reasons, as its antecedents, agriculture and manufacturing. Agriculture began as a labour-intensive industry of subsistence farming. Over time, segments of farming became more productive as inventors and innovators developed and marketed tools and machines to make farms more productive, that is, able to feed more people. The tools and machines made it possible for fewer people to produce more food. Thus, employment in agriculture decreased as production of food increased.

Likewise, production of goods began as craft industries in which individuals made consumer items for themselves and their neighbours. Through technological innovations in tools and work processes, the amount of production increased. Gradually, machines replaced individuals with tools, allowing even greater production. More recently, automated systems are replacing machines to permit increasing levels of production with fewer employees. In some cases, innovations take the form of disruptive technologies that spawn whole new industries in the Schumpeter implied process of creative destruction (Kirchhoff, 1994). Computers and communications are examples.

Economics- and business literature contains elaborate models and explanations of the economic motivations and activities that these analogies evoke. It is not our purpose to replicate, or even summarize, that literature. Rather, we assume a general understanding of the relevant literature and move directly to a description of the dynamics of evolution in services, using the health-care industry as a focus.

Few would argue that the health-care industry involves knowledge-based, face-to-face services. Health-care professionals, particularly those in the mainstream medical industry, are educated and trained to diagnose, prescribe, treat, inform and educate patients in one-to-one transactions. Health-care services are accessed in two ways. An individual can self-diagnose and medicate using available products and services or can consult a physician. If the patient consults a physician, the patient provides facts and the physician translates those facts into symptoms and a hypothesis. The physician prescribes tests and arranges for specialist consultations based on the hypothesis. Based on knowledge, experience, skill and test results, the physician makes a diagnosis, informs the patient and prescribes treatment. It is this application of the physician's knowledge that cat-

analyzes use of other components of the health-care industry, many of which cannot act in the absence of a physician's prescription. Thus, health-care services of all kinds derive from these physician-patient encounters.

Research shows that this traditional system, now being challenged by the shift to managed health care, resulted in a heterogeneous mix of physician treatment decisions for similar conditions in comparable patients. Additionally, in the U.S., medical care is delivered within a framework of state licensing laws, with the authority to set the rules by which physicians practise. In nearly all states, the authority to regulate physicians is delegated to the physicians. This, combined with the fast-disappearing fee-for-service payment system, with its incentive to over-treat, constitutes what economists call the physicians' monopoly. In the context of the continuum by which we categorize services, it is difficult to conceptualize how physician services will get to the knowledge-embedded stage. Physicians have few incentives to embed their knowledge in product components that would reduce the need to see patients. They get paid for seeing patients, and they have the political power to define their own duties and responsibilities. The managed-care mechanism of capitated payments (a set rate per month per patient regardless of how often the patient is seen) has not yet had an identifiable impact, though it might eventually. Most specialists continue to be paid fee-for-service, though access to specialists is often restricted to referrals by a primary-care physician unless the patient is willing to share the cost of self-referral. There are no current challenges to physician political power though managed-care organizations do everything within their authority to affect physician practices by contractual means.

Yet there are elements of health services that have made the transition to knowledge-embedded or knowledge-separated services. For example, there are diagnostic computers that read patient symptoms and present the diagnoses possible based on the symptoms. CAT scan machines and MRI machines expand the diagnostic capacity of physicians. Computers transmit outputs of these machines to far-off places so specialists can be consulted without face-to-face meetings. Some blood tests have been moved from the laboratory to the patient's hospital bedside. Where formerly a lab technician drew a patient's blood and transported it to the laboratory for analysis, a nurse now draws the blood at bedside, puts it in a hand-held analyzer and reads the results within seconds. As a result of embedding knowledge, labour time and energy are saved, and productivity is increased, as is the potential for better quality patient care. Also as a

result of embedding knowledge, the need for additional services has been generated. Physicians and nurses need to be trained to use the product components, computers and devices must be calibrated, monitored for accuracy and repaired when necessary. Services moving through the continuum beget the need for more services.

The same scenario applies to health services that have moved to the knowledge-separated end of the continuum. For example, pregnancy tests are available over the counter at the local pharmacy, as are blood pressure machines. Determining one's pregnancy in its early stages or monitoring one's blood pressure formerly required a physician visit. Now it requires only a quick trip to the store and the ability to read simple instructions and understand the results. Nonetheless, knowledge-based physician services are not precluded. Indeed, the self-administered tests simply eliminate unnecessary visits. If the pregnancy test is positive, or the blood pressure too high, the prudent individual will call for an appointment. Thus, knowledge-separated health services eliminate the need for some services while generating the need for others.

The point here is that the transition of services from one point on the continuum to the next is not necessarily accompanied by a diminishing services labour force, as were the analogous industries, agriculture and manufacturing. This is because the transition from one point to the next has two results. The service undergoing the transition becomes less labour intensive, but the product components that result from the transition must be produced and maintained, and workers must be trained to use and maintain them. Additionally, those providing the knowledge-based services undergoing transition may be using their knowledge-base and the time saved to design and offer new services to ensure their own survival. If this is the case, then the service industry may indeed be a constantly expanding one, at least to the limits of a society's labour supply time, energy and inventiveness. It is, at least, a constantly shifting one, as services beget services of different kinds requiring knowledge and skills of different kinds. Witness, for example, the profound shift in knowledge and skill requirements of the subsequent generation of workers caused by the computer and communications industries. Societies that wish to maintain economic vitality will encourage development of knowledge-based services.

This example of how services evolve from one stage to another is indicative of the service sector as a whole. However, the evolution can be constrained as well.

Effects of constraints

Services, like business firms, can be strained by internal and external factors (Kirchhoff, 1994). Internal factors refer to those associated with the service or its providers. External factors refer to those in the environment, that is, legal, social and economic constraints.

Internal constraints of a service are related to the service and its context. For example, a dog-grooming service is confined to a geographic area because the ability to provide the service is dependent upon travel to the service or by the service to the customer. A mobile dog service will go out of business quickly if the travel time exceeds the grooming time. The price of travel plus a grooming would dissuade dog owners from purchasing the service. Likewise, a lawn-service business will not contract to do yards several towns away, for the same reason. The geographic constraint is one reason why franchising is such a popular organization structure for many services. Franchising permits broad-based marketing and name recognition for services that must necessarily remain local in their delivery. Anyone who travels extensively by car in the United States can attest to the desirability of service franchises. In unfamiliar territory, it takes the guess out of choosing and assures a predictable level of quality food and lodging.

In contrast, Internet services have virtually no geographic boundaries. They reach a world-wide audience. On the other hand, Internet services are restricted to those who are skilled in surfing the net. Computer illiterates cannot be Internet service customers.

Internal constraints also can derive from the service provider. For example, the capacity to produce services is constrained by the amount of time and energy available to provide the service. One cannot expect a human service provider to be available 24 hours a day like an ATM machine. Of course, some services are available 24 hours a day, but the same individual does not deliver them all the time. When the shift changes, a new person is providing the service. It is important to note, however, that for the same service to be provided by multiple persons, the knowledge and skills must be transferable to others. If a person has a truly unique service but refuses to teach anyone else how to do it, then the service capacity for that service is limited to the capacity of one individual. Service expansion is not possible; it is internally constrained.

As noted in the health-care example, physicians have little incentive to make themselves expendable by embedding their knowledge in products that can be used without their assistance. This creates a strong incentive to resist innovations and to build barriers to entry for other service providers. It is well known, for example, that many professions use professional language (jargon) to protect the service. The language becomes a code to exclude outsiders from understanding what the professionals do. As noted above, physicians (and other professionals as well) are able to use the law to protect their profession and prevent innovations. Thus, external means serve internal goals.

External constraints are outside of the service and its providers. External constraints may be legal, social or economic. Legal constraints refer to laws and regulations that preclude or protect the service. Services can be illegal, for example selling illegal drugs. Laws also specify standards for many services, to protect the customer and/or the provider. To provide child care in one's home, for example, one may have to pass a safety inspection and be required to provide hot lunches for the children. There may be a limit to the number of children cared for.

In the example of physicians' authority to regulate the practice of medicine, there are heated debates about restrictions on the practice of medicine. In the U.S., nurses argue that they should be allowed to perform functions like physical examinations. It took years for podiatrists and chiropractors to become recognized medical practitioners. Midwives are not authorized to practise in some states. Physician extenders such as physician assistants and nurse practitioners are under-utilized because physicians fear their encroachment and block their independence from physician supervision. Only in areas where there is a shortage of physicians can these professionals practise the simplest of medical functions independently.

Social constraints on services refer to cultural values that make a service acceptable or objectionable. Many social values are legislated, so social constraints and legal constraints are similar. However, it is important to recognize social constraints because they often explain why a certain service is not offered. For example, many studies in the U.S. show that it is difficult to get African- and Caribbean-Americans to use health services routinely to prevent more expensive episodes of care, and frequently hospitalization, when their problems reach the crisis stage. The cultural reluctance stems from the fact that physical problems are endured without complaint or cultural remedies are

tried. Medical care is an undesirable option to be avoided as long as possible.

On the other hand, the social/legal dilemma is clearly demonstrated by different approaches to services like prostitution and voluntary drug use. The Netherlands regulates these behaviours but does not criminalize them. The United States (selectively) criminalizes the behaviours and puts the customer at the mercy of the provider: let the buyer beware. The social consequences of these choices show up in levels of violence, cost of incarceration, and incidence statistics for sexually transmitted diseases and HIV/AIDS.

Economic constraints also exist. Services can be constrained by a shortage of capital. Industrialized countries make more services available to citizens than developing nations do, and there are more services available in the private sector. At an organizational or individual level, not having access to necessary education or training, or the money to buy equipment, or the talent and skills to market the services for sustainability and growth, can constrain services. For example, we all know of individuals who have really good ideas for services. They may even have started a business and want to see it grow. When they go to a bank for a loan to extend the business, however, the bank will not lend them the money they need to grow because the business has few 'hard' assets to offer as collateral. So the business stays small. It is externally constrained by the bank's reluctance to loan money to someone without assets.

In essence, the service sector of an economy is dynamic, always in flux and spawning new services as rapidly (or more so) as services disappear because they are no longer needed. This reality is the reason we argue that the methods of classifying services are outdated and unable to give a true picture of the role of services in an economy. The continuum we advocate here has the potential for making services, and the role of services in the economy, more representative of reality. However, at this time, it is not possible to put numbers to the conceptual scheme so as to describe an economy according to these categories. Rather, the conceptual scheme as a way to identify new services, to forecast where new services are likely to occur, and to develop public policies for facilitating the development of new services. Those issues are addressed in the next chapter.

5.4 New-service identification and facilitation

5.4.1 Introduction

Development of a conceptual scheme to understand services in a technologically dynamic economy provides a foundation for classifying new services and developing policies to facilitate the introduction of new services. Identifying new services and facilitating their introduction and growth are important to a society's economy because services provide the major source of future employment in modern economies. In this chapter we provide a way to distinguish 'new' services and suggest economic policies that help encourage a vigorous service sector.

5.4.2 What are new services?

Distinguishing new services from existing services requires a definition that permits categorization of services as 'new' or 'existing'. The continuum presented provides criteria to define 'new' services. These criteria derive from the types of changes occurring as services make the transition from knowledge-based to knowledge-embedded and then to knowledge-separated. The changes taking place are changes in technology, provider/customer interactions, service dimensions and service environment.

The changes in technology are identifiable in the substitution of product components for personal interaction in service delivery. The changes in provider/customer interactions are recognizable as less required interaction needed to gain service benefits. Changes in interactions also may be recognizable in the addition of service options offered by the knowledge-based service provider. Changes in service dimensions indicative of new services are those that provide the customer with greater value, for example 24-hour access rather than normal business-hours access. Changes in the service environment are those that require changes in the education and training involved in maintaining the service infrastructure (product components and customer service).

Based on these changes, a new service can be defined as one that represents movement along the continuum or is catalyzed by movement along the continuum. Movement can be discerned by asking relevant questions. These questions are:

- Has there been a change in the amount of face-to-face interaction required between service provider and consumer?

- Are service providers introducing different knowledge-based services?
- Has the amount of consumer knowledge needed to obtain the service been reduced?
- Have product components been incorporated in the service?
- Is the service available in new locations and at more convenient times?
- Is the service spawning new knowledge and skill requirements?
- Is technical support or problem-solving a dominant element of customer service?

A 'yes' answer to more than one of these questions suggests that a service is new. One must be careful, however, to recognize the difference between expansion of existing services and introduction of new services. If a bank opens a banking window in a supermarket so customers can complete certain financial transactions, only the question about new locations and times can be answered affirmatively. The service remains labour-intensive, and no transfer of knowledge to product components has occurred. Existing services have been expanded but no new service has been introduced. ATMs, however, are a different matter. ATMs involve reduction in interactions between service provider and customer *and* new product components *and* new locations and times. ATMs also spawn new knowledge and skill requirements for maintaining the service environment, and human interaction exists solely for problem-solving in service delivery. The ATM clearly is a new service.

The point is that categorizing services as 'new' requires thoughtful answers to the questions and careful evaluation of the meaning of those answers. It is likely that careful inquiry into services phenomena will yield valuable insights about relative contributions of different services to economic vitality. However, economic policy cannot await definitive answers. It is important to maintain economic vitality in spite of gaps in knowledge. Indeed, the continuum itself and understanding of the dynamics are sufficient to identify policies that are likely to be effective for facilitating service-sector employment and growth.

5.4.3 Policies to energize the service sector

Economic policies for energizing service-sector employment and growth can be categorized according to the continuum already described: knowledge-based, knowledge-embedded and knowledge-separated. We do not intend an exhaustive review of policies. Rather,

we intend to suggest areas of public policy and examples that will serve to create a hospitable environment for services.

Knowledge-based policies

Knowledge-based services are those that depend upon the knowledge invested in people. In a sense, knowledge is the technology involved in the service. We have given many examples of knowledge-based services, ranging from those requiring high levels of knowledge (education) and skill (training), like medical professionals, teachers, computer engineers and technicians. We also have noted examples of knowledge-based services requiring very little education and minimal skills, like dog walking and house cleaning. In-between are a wide variety of services, some requiring more education than training and some requiring more training than education.

Since the technology involved in these services is gained largely through education, public policies that encourage education and training are important. These may include subsidies to encourage continuing education and for training and retraining as product-component technologies change. Knowledge-based policies certainly include intellectual-property rights to protect ideas and systems of service delivery. Such policies also include requirements for practising the knowledge-based service: licensing laws, certification of skills, standards of practice behaviour, duties and liabilities. As noted before, however, knowledge-based policies can also inhibit these services. If laws are unreasonably restrictive, they can prevent entry into the service sector or raise prices beyond what people are able or willing to pay, thereby restricting economic activity. Furthermore, care must be taken that the policies do not inhibit the technological evolution of knowledge-based services into knowledge-embedded or knowledge-separated services. Thus, policies must strike a balance between protection of current service providers and stimulation of service expansion, innovation, and technological evolution.

For example, one of the issues in the U.S. health-care system is whether one needs a physician or nurse to do certain activities, or whether these activities can be placed in the hands of less educated and skilled workers. The questions arose as a result of skyrocketing health-care prices and the entry of corporate management into the sector. These questions challenge the entire health-care infrastructure, from its legal framework to the point of service delivery, and cause realignment of many roles within it. Laws in some states prohibited use of physician assistants, thereby insuring maintenance of

physician-only patient contact. Another area of concern is the availability of loan funds for service organizations.

Historically, financial institutions have prided themselves on securing commercial loans with liens on business assets. This is called asset-based lending. But service organizations, especially knowledge-based services, have few assets and do not need assets to perform their services. Thus, knowledge-based service organizations need working capital but are unable to borrow it. Financial-institution policies need to be reviewed and adjusted to accommodate these financial needs if new services are to be encouraged.

Knowledge-embedded policies

Knowledge-embedded services exhibit product- or system components that replace some of the knowledge required to deliver the service. The knowledge is transferred to the product component or the system of service delivery. As services evolve toward or operate in this stage of development, intellectual-property rights are as important as they are for knowledge-based services. This is because some of the knowledge has been embedded in a product component that also must be protected so that others cannot replicate and market it to the detriment of its originator. If the profit incentive is removed, there is little incentive for someone to embed knowledge in a product component that will make the service more widely available and stimulate economic growth.

In addition to intellectual property rights, policies for transferring knowledge to others are important. At this stage, the technology can be licensed to others as a way of expanding the service-delivery capacity. Aspects of contract law need to facilitate expansion without inhibiting new-service development. At the knowledge-embedded stage, anti-trust legislation is important as a balance to property-rights legislation. Especially with new technologies, it may be possible to establish a monopoly, as is a current concern in the U.S. with Microsoft.

Standards remain important at this stage of service development as well. Standards may shift focus from the person delivering the service to the product components of the service, but standards may need to be required by public policy nonetheless. For example, warranty coverage and technical support in using the product components of service delivery may be necessary to assure appropriate service.

It should be noted that the education and training policies mentioned above also help to facilitate service-sector development if they support development of the workforce needed to build, maintain and support product components of the knowledge-embedded service. This is because a substantial human component remains in this stage of the service-sector continuum, although the focus is less on direct customer interaction and more on the product components.

Knowledge-separated policies

At the knowledge-separated end of the service continuum, nearly all the knowledge needed to consume the service rests with the consumer. Personal interaction with a service provider is not necessary except to solve problems encountered in using product components of the service. ATMs are one example that we have used throughout this document. Internet services are another. ATM service fees may need regulation as consumers find themselves increasingly dependent upon a monopolized service. And, regulation of the Internet may be needed as abuses of the system expand. Interestingly, the advances in technology that make these services more useful and convenient also bring opportunities for abuse.

At this point in the continuum, important public policies also deal with reliability of product components, for example standards for the issuance of warranties and replacement or repair guarantees. In the case of elaborate technical product components like the service infrastructure of the banking industry or reliability of analytic devices in the health-care industry, frequent quality checks may be mandated and minimum training and certification of personnel dealing with the machines and equipment may be required.

Consumer protection in gaining access to the service also is important, for example privacy issues and the Internet.

5.4.4 Conclusions

The policy recommendations herein are rather broad and general, and they are meant to be suggestive rather than definitive. However, it is important to note that governments need to be aware that evolution from knowledge-based to knowledge-separated services moves services from a large number of independent producers to a much smaller number of sophisticated technology providers. In other words, the opportunity for monopolistic abuses increases. Sophisticated technologies also create an environment where those with the technological skills can abuse the systems for their person-

al benefit (fraud). The rise in bank theft through computer crime is a typical example. Adjusting for such technological abuse will require new definitions of crime and new laws to discourage abuse.

Regardless of the potential abuses, it is unlikely that policies can be made to inhibit the adoption of knowledge-separated services that meet the needs of consumers with more access, quality and quantity of service. One cannot legislatively stop the spread of the Internet or remove all ATM machines. Therefore, efforts must be made to make services safe and effective.

To encourage innovation and realize the cost savings from the technological evolution of services, public policy must focus on educating and re-educating the workforce. The rate of technological change is phenomenal in modern economies. Today's specialist becomes obsolete in ten to fifteen years. Speech recognition software, perhaps only months away from practicality, will make the computer expert who is highly skilled in typing no more useful than a newly minted programmer with current keyboard abilities.

Perhaps the interesting question is whether technology can perform all current knowledge-based services. Says T. Brock Hinzmann, chief technology navigator at SRI Internation: 'What if you off-load services from people altogether? I'm not talking just about simple technology like speech recognition – what if it includes creativity?' (source: Business Week, August 31, 1998, p. 74). The possibilities are indeed endless.

6 Synthesis

6.1 Introduction

The service industry is a highly dynamic part of the economy. Nowadays we observe all kinds of services that can be seen as 'new services'. In the previous sections an analysis was made of this phenomenon. The first chapters of this research report contains a report of the Dutch analysis, and in chapter 5 the contribution of the U.S. is presented. Both parts use a different approach. In this final chapter we try to match both approaches, i.e. we try to answer the question if there are similarities between the Dutch and the U.S. approach and how we can best describe the phenomenon of new services.

6.2 Characteristics: CHIPs framework no longer fully applicable

The traditional characteristics of services in general are: co-production, heterogeneity, intangibility and perishability (CHIPs). The Dutch analysis showed that these four characteristics are no longer fully valid to characterize new services. For example, under the influence of IT, the aspect of time and place is changing. IT makes it possible to separate production and consumption in time. Production of a new service can happen earlier than consumption, because it is possible to create a certain amount of stock. To be able to receive the service, the consumer only has to give some extra data (through the Internet, for example). Direct interaction is not necessary anymore. New services that are directed to persons (personal services) however are still well characterized by CHIPs.

The U.S. analysis of CHIPs also concluded that these are obvious characteristics of at least the traditional services, although the degree of each component of CHIPs may vary depending on the service provided. A useful analysis of these degrees by comparing consumer participation with the ability to control inputs is given by the Goodwin and Radford model. The model demonstrates that a wide variety of interactions is possible in different circumstances. Of the four models presented, only the 'therapy model' (strong interaction) can be seen as a description of the situation in 'old' services, especially personal services like psychotherapy.

Next, the location of interactions is mentioned by the researchers. Consumer-provider interactions can be at the provider's or consumer's site, or at a remote site facilitated by telecommunications.

Many new services are IT-related. An important reason why Internet services such as electronic commerce are booming these days is that these services especially meet the requirements for convenient site, at any hour of the consumer's choice and reasonable privacy.

From the Dutch and the U.S. analyses, the conclusion can be drawn that only strict personal new services such as personal styling, consultancy or personal training still fit in the CHIPs model. These new services cannot (yet) be taken over by computers.

6.3 Driving forces behind new services

One way of looking at the phenomenon of new services is by describing (other) outside forces that influence the development of new services. First, technological changes can be mentioned. The introduction of the computer has been crucial for the development of a lot of new services. Secondly, the socio-economic changes in society must be mentioned. Financial influence combined with the customer's lack of time is a strong reason for offering in particular new personal services. Also society is becoming more and more individual-oriented. New services that combine the need of individuality with possibilities to express oneself flourish these days. The fourth force is (de)regulation. By stimulating competition, especially in public services, the government in the Netherlands contributes to (dynamics) services. And, last but not least, demographic forces play an important role. For instance more and older people will require more (medical) care. Reduced public financial means will lead to private-care services growing in number. It must be clear that a combination of forces always stimulates development of new services.

6.4 Services and IT

The Dutch study describes forces in society that influence the development of new services. Technology changes are one of these forces. As noted above, computers (IT) play an ever-increasing, sometimes even crucial role in the service industry. Many new services arise only because of the introduction of new information technology. In fact the concept of services has expanded to a very complex multidimensional model of interactions among providers (people and machines) and consumers (people, objects and machines). In the Dutch analysis this type of new service is called IT-related new services.

In the U.S., the technology aspect is studied more profoundly. To be able to describe the impact of technology and classify these new services, the U.S. researchers introduce a model to classify new services

by their technology content. The technology content is measured indirectly by the extent to which the knowledge that is required for the service is vested in the human provider of the technology of a machine. Knowledge is defined as the set of skills, expertise, know-how and organization of work people possess. The U.S. researchers introduce a service continuum in which knowledge-based services, knowledge-separated services and knowledge-embedded services can be found. Knowledge-based services are services in which customer value is provided by the knowledge of the person providing the service, often these are personal services. When customer value is (fully) provided by an automated system delivering the service, these services are called knowledge-separated services. The customer value is provided by the knowledge of the customer in acquiring services. The only knowledge necessary to receive the service resides with the customer. The customer needs only to know how to receive the service by using the product component. In-between we find knowledge-embedded services. Knowledge-embedded services are those services where the customer value is provided by the automated system delivering the service. The service starts with an automated component, but the actual service is provided by a trained professional, for example travel services.

6.5 Defining and classifying new services

The service sector of an economy is a dynamic one. New services appear and 'old', no longer necessary services disappear. The question the U.S. and Dutch researchers try to answer is, 'how one can look at this phenomenon and how does one have to define and classify new services?'

The first step is to define the term 'new' in new services. The analysis in chapter 4 shows that we have to separate 'new' (did not exist before) from 'renewed'. A renewed service is often indicated as a different (new) way of offering the service or a combination of 'old' (existing) services, for instance delivering meals at home or selling products through the Internet. Most IT-related new services are in fact renewed services. New is also not seen/experienced before. When does a new service become a standard service, i.e. the service is used by so many people that it has become standard? The application of the product life-cycle (PLC) model shows that new services are usually in the introduction- or growth phase of the PLC, and they become standard when the next phase (maturity) is entered. This stage is characterized by the fact that most of the potential customers bought or have bought the service. The number of re-buys is stable.

In this stage no new elements and/or characteristics are added to the service.

Another way of looking at new services is the movement along the continuum knowledge-based – knowledge-embedded – knowledge-separated. The U.S. researchers suggest that new services can be identified by asking questions about the appearance of the service, such as ‘Has there been a change in the amount of face-to-face interaction required between service provider and consumer?’, or ‘Has the amount of consumer knowledge needed to obtain the service been reduced?’.

When we are looking at the PLC we also evaluate a movement, especially changes in awareness of a service. We look at the transition from not existing (too few people are aware of the new service) to standard services by evaluating the number of customers who must be aware of the service at a certain moment.

6.6 Integration Dutch analysis - U.S. analysis

When we ultimately try to combine the Dutch part and the U.S. part of the research by applying the continuum knowledge-based – knowledge-separated – knowledge-embedded to several new services encountered in the Netherlands, we can see whether the two approaches are really different or may be seen as alternative ways of looking at new services. Table 1 shows the result of this assessment.

table 1 evaluation of services based on the technological-evolution continuum

New services	Knowledge- Based	Knowledge- Embedded	Knowledge- Separated
Technology			
Ordering books through the Internet			X
Selling through the Internet			X
Internet provider			X
electronic telephone directory (CD-ROM)			X
home banking		X	
virtual education		X	
virtual doctor service		X	
web site consultant/producer		X	
electronic railway schedule			X
chat (etc.) boxes		X	
banking at supermarkets		X	
cash dispenser (ATM)			X
money-changer machine (foreign currencies)			X
new electronic paying system in supermarkets (by radiographic chip)			X
chipknip (bank card for small pays)			X
paying by bank card (electronic pay)		X	
paying parking fees by bank card		X	
phone call payments by bankcard			X
mobile communication			X
home-tagging of convicts		X	
electronic route planners and guide		X	
electronic alert system for the elderly still living at home		X	
mediation service in surrogate motherhood cases	X		
Personal Services			
dog-walking service	X		
ironing service	X		
home delivery of meals service		X	
odd-job service (in and around the house)	X		
mobile (ambulant) hairdresser		X	
mail-order service for pharmaceutical products		X	
house-cleaning service	X		
breakfast-home delivery service		X	
organiser	X		
(home) car-cleaning service		X	
home service for repairing personal computers		X	
home-care for handicapped and permanently ill people	X		
in-company physical therapy (Physio bus)	X		

New services	Knowledge- Based	Knowledge- Embedded	Knowledge- Separated
Personal services (continued)			
Drive-in restaurant (Mc-Drive)	X		
ready-made food in supermarkets		X	
selling books in supermarkets		X	
self-service at supermarkets		X	
self-service at petrol stations		X	
flexible child-care service		X	
alternative transport services (e.g. water taxi)		X	
valet service, guide and transport service (e.g. taking care of your car while shopping)		X	
holiday parks (bungalows)		X	
hairdressing for Afro-hair	X		
temporary employment agency for people who do not speak the Dutch language	X		
various courses for personal development (e.g. personal style consultancy)	X		
horoscope-consultancy executive search	X		
(international) etiquette consultant (for managers)	X		
consultants for (former) expats	X		
individual funeral-arrangement service	X		
exclusive, customised travel itineraries		X	
alternative ways of imprisonment		X	
Financial services			
green investment funds		X	
click funds	X		
Environmental and government services			
green electricity		X	
environmental consultancy	X		

The assessment shows that many technology driven new services are mostly knowledge-embedded and knowledge-separated services, while personal new services are mostly knowledge-based and knowledge-embedded. The new services that are knowledge-based are services that generally arise from recent cultural, social and economic forces. Also can be concluded that most embedded services can be seen as renewed services; the way in which they are rendered is different from before or they form a combination of already existing services. The knowledge-separated services, finally, are new services that arise from technology (IT) that was not available in the past.

6.7 Conclusion

From the analyses the conclusion can be drawn that the way of looking at new services is possible in two different ways, either by looking at the degree of novelty and the development stage of the service,

or by considering the movement along the continuum knowledge-based – knowledge-separated – knowledge-embedded. Both ways give a good indication of what new services are and how we can define them. It is also possible to combine the two approaches. The new services may thus be described as follows:

- New services are services that are new or renewed to the (potential) customer
- Services can be considered new as long as they are in the introduction phase or in the growing phase when looking at the development in time
- New personal services are mostly knowledge-based
- Renewed services are often knowledge-embedded
- New services that arise from new technology can often be seen as knowledge-separated services.

6.8 Perspective for future developments

In this research report the phenomenon of dynamics in service industries is studied. Many new services are available in daily life. In this study an analysis is made of the developments that result in new kinds of services and how we can describe new services.

The study leads to three conclusions with relation to future developments in new services:

1. Social/cultural changes as well as technological developments are likely to continue. Therefore, many more renewed and completely new services can be expected to emerge in the near future.
2. New and renewed services sometimes replace traditional services (for instance selling through Internet instead of through traditional outlets), but they also generate more new services. Because knowledge-embedded and knowledge-separated services need design, maintenance and repair, quality checks, privacy assurance, etc., many 'new' knowledge-based services will appear.
3. The continuity dynamics of both personal and business services create both opportunities and threats for small firms. Opportunities can be found in (the development of) personal services and new knowledge-based services. Threats could originate from investments needed for knowledge-separated new services.

6.9 Future research on the subject of new services

Now that we have more insight in new services, new research problems become apparent. As most of the new service providers are SMEs, it is necessary to study the impact of (dynamics in) new services in this part of the economy. Items that are interesting fields of further research are:

- New services and SMEs: the impact on the economy in general and the number of SMEs in particular
- Development of new services: success and failure
- Impact of IT on the development of new or renewed services in the SMEs
- Sectors in which new services appear and the impact on those sectors
- Implications for employment and education level
- Movements/shifts from SME to large industry and vice versa.

Literature

Aa, W. van der, en T. Elfring, Innovaties en strategieën in de dienstensector ('Innovations and strategies in the servicesector'), in: *Dynamiek in de dienstensector*, Rotterdam, 1988.

Alic, J.A., (1994). 'Technology in the Service Industries', *International Journal of Technology Management*, 9 (1), pp. 1-14.

Bateson, J. (1977). 'Do We Need Service Marketing', in: *Marketing Services: New Insights*, P. Eiglier, E. Langeard, C.H. Lovelock and J. Bateson, ed. Cambridge, MA., Marketing Science Institute.

Berg, S.V. (1973). 'Determinants of Technological Change in the Service Industries', *Technological Forecasting and Social Change*, 5, pp. 407-426.

Business Week, 1998a, 'A Rising Tide', August 31, p. 74.

Business Week, 1998b, 'Alan Greenspan: An Unlikely Guru', August 31, p. 70.

Business Week, 1998c, 'The Corporation of the Future', August 31, pp. 102-106.

Collier, D.A. (1983). 'The Service Sector Revolution: The Automation of Services', *Long Range Planning*, 16 (6), pp. 10-20.

Collier, D.A. (1985). *Service Management: The Automations of Services*, Reston, Virginia, Reston Publishing Co.

Cronin Jr., J.J., and S.A. Taylor (1992). 'Measuring Service Quality: A Re-examination and Extension'. *Journal of Marketing* 56 (July): 55-68.

Edgett, S., and S. Parkinson (1993). 'Marketing for Service Industries: A Review'. *The Service Industries Journal* 13 (3): 19-39.

EIM, *Oplevend ondernemerschap in Nederland (The revival of entrepreneurship in the Netherlands)*, Zoetermeer, 1997.

Elfring, T., *Innovatie en concurrentiekracht in de dienstensector (Innovation and competitiveness strength in the service sector)*, Rotterdam, 1997.

Goodwin, C., and R. Radford (1993). 'Models of Service Delivery: An Integrative Approach', in: *Advances in Services Marketing and Management: Research and Practice*, T.A. Swartz, D.E. Bowen and S.W. Brown, ed. Greenwich, CT, JAI Press Inc.

Gronroos, C. (1990). *Service Management and Marketing: Managing the Moment of Truth in Service Competition*. Lexington, MA, Lexington Books.

Gummesson, E. (1993). 'Quality Management in Service Organizations'. *International Service Quality Association*.

Hayes, R.M., and E.A. Thies (1991). 'Management of Technology in Service Firms', *Journal of Operations Management*, 10 (3), pp. 388-397.

- Jong, M.W. de, *De dienstensector: transacties in transformatie (The service sector: transactions in transformations)*, Leiden/Antwerpen, 1991.
- Kirchoff, B.A. (1994). *Entrepreneurship and Dynamic Capitalism*, Praeger: Westport, Conn.
- Kok, J.M.H., *Nieuwe vormen van arbeid: potenties voor nieuwe werkgelegenheid (New forms of labour: potentials for new employment)*, Bundel Arbeidsmarktdag, 1998.
- Kotler, Ph., *Principles of marketing*, New Jersey, 1983.
- Kupfer, A. (1998). 'The Real King of the Internet', *Fortune*, September 7, pp. 84-90.
- Lee, M. (1995). 'Leading the Way: College and Campuses Provide an Insight into How Technology May Change the Nature of Instruction', *The Wall Street Journal*, November 13, p. R28.
- Lin, A. (1995). 'Far Out: Distance Education Is More Than a Camera in a Classroom', *The Wall Street Journal*, November 13, pp. R28.
- Lovelock, C.H., and G.S. Yip (1996). 'Developing Global Strategies for Service businesses', *California Management Review*, 38, pp. 64-86.
- McDermott, C.M., H. Kang and S. Walsh (1997). *A Framework for Technology Management in Services*, unpublished working paper, Rensselaer Polytechnic Institute, Troy, NY.
- Morone, J., and D. Berg (1993). 'Management of Technology in the Service Sector: Practices in the Banking Industry'. *The Journal of High Technology Management Research* 4 (1): 123-137.
- Quinn, J.P., J.J. Baruch and P.C. Paquette (1988). 'Exploiting the Manufacturing-service Interface', *Sloan Management Review* (Summer), pp. 45-56.
- Rathmell, J. (1966). 'What is meant by services?', *Journal of Marketing* 30 (4).
- Rathmell, J. (1974). *Marketing in the Service Sector*. Cambridge, Winthrop Publishers, Inc.
- Schlikker, R., Huishoudelijk werk de deur uit ('Facility work: getting it down'), in: *FEM*, nr. 5, 1998.
- Schooleman, S. (1993). 'Service Technology Positions Pyxis for Success', *Health Industry Today*, 56 (6), pp. 16-17.
- Shostack, G.L. (1977). 'Breaking Free from Product Marketing'. *Journal of Marketing* (April), pp. 73-80.
- Suyver, J.F., H.J. van Driel en W.J.P. Vogelesang, *De toekomst van de supermarkt (The future of the supermarket)*, HBD, Den Haag, 1998.
- Thomas, D.R.E. (1978). 'Strategy Is Different in Service Businesses', *Harvard Business Review*, 56, pp. 158-165.
- Thukral, I.S. (1995). *Quality in Services Through Design: An Integrated Approach, and unpublished doctoral dissertation*, Rensselaer Polytechnic Institute, Troy, NY.
- TNO, *Kennis voor de dienstensector (Knowledge for the service sector)*, TNO-beleidsstudies en advies, Amsterdam, 1996.

TNO, *Innovaties in diensten (Innovations in services)*, TNO-beleidsstudies, Amsterdam, 1993.

Tweede Kamer, *Werk door ondernemen (Work by entrepreneurship)*, 24 243, nr. 1, 1994-1995.

Vitale, R. (1986). 'The Growing Risks of Information Systems' Success', *MIS Quarterly*, 10, pp. 327-334.

Zeithaml, V.A., A. Parasuraman and L.L. Berry (1985). 'Problems and Strategies in Service Marketing', *Journal of Marketing* 49 (Spring): 33-46.

Zeithaml, V.A., A. Parsuraman and L.L. Berry (1990). *Delivering Quality Service*, New York, The Free Press.

Appendix I: List of new services identified

Technology

Ordering books through the Internet
Selling through the Internet
Info services on the World Wide Web
Electronic telephone directory (CD-ROM)
Home banking
Virtual education
Virtual doctor service
Electronic tax returns
Internet via TV instead of via computer
Virtual intermediaries
Electronic railway schedule
Internet-café
Shopping via the Internet
Chat boxes, etc.
Banking at supermarkets
Cash dispenser (ATM)
Money-changer machine (foreign currencies)
New electronic payments system in supermarkets (by radiographic chip)
Chipknip (bank card for small payments)
Paying parking fees by bank card
Phonecall payments by bankcard
Mobile communication
Home-tagging of convicts
Electronic route planners and guide
Electronic alert system for the elderly still living at home

Mediation service in surrogate motherhood cases

Personal services

Dog-walking service
Ironing service
Home delivery of meals service
Odd-job service (in and around the house)
Mobile (ambulant) hairdresser
Mail-order service for pharmaceutical products
House-cleaning service
Breakfast home-delivery service
Organizer
(Home) car-cleaning service

Home service for repairing personal computers
Home-care for handicapped and permanently ill people
In-company physical therapy (physio bus)
Gift-delivery service

Drive-in restaurant (Mc-Drive)
Ready-made food in supermarkets
Selling books in supermarkets
Flexible child-care service
Alternative transport services (e.g. water taxi)
Valet service, guide and transport service (e.g. taking care of cars while shopping)
Holiday parks (bungalows)
Hairdressing for Afro-hair
Temporary employment agency for people who do not speak the Dutch language

Various courses for personal development (e.g. personal-style consultancy)
Horoscope-consultancy executive search
(International) etiquette consultant (for managers)
Consultants for (former) expats
Individual funeral-arrangement service
Exclusive, customized travel itineraries

Financial services

Green investment funds
Click funds
Mortgage-savings scheme
New investment funds

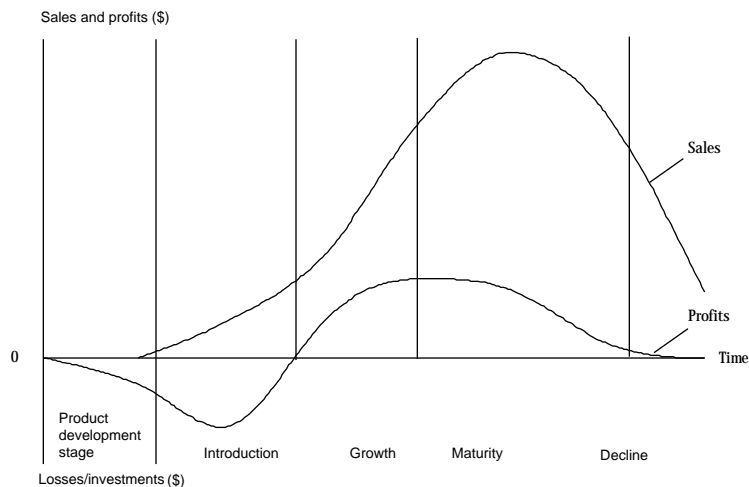
Environmental and government services

Green electricity
Road pricing
Additional insurance cover, supplemental to social-insurance schemes
Arbo-services
Retourrette
Car sharing

Appendix II: The product life-cycle¹

The point of departure for the product life-cycle entails that every product encounters various phases, ranging between the time of development to the time of market 'dis-launching'. Chart II-1 illustrates the hypothetical course of a product's sales and profits from the time of its inception as an idea to its demise. During product development, the company accumulates increasing cost. After the product is launched, its sales pass through an introduction period, then through a period of strong growth, followed by maturity and eventually by decline. Meanwhile, its profits go from negative to positive, peak in the growth or mature sales stages, and then decline.

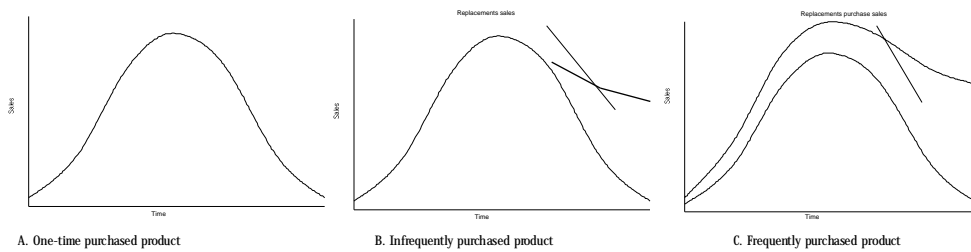
chart II-1 sales and profits over the product's life from inception to demise



Given the rapid changes in tastes, technology, and competition, a company cannot rely only on its existing products. Every company needs a new-product development program. By 'new products' is meant *original products, product improvements, product modifications and new brands*. A company's development strategy should state what products and markets to emphasize. It is also important that management use sales forecasting methods. The sales of a product depend much on whether it is a one-time purchased product, an infrequently purchased product, or a frequently purchased product. Chart II-2 illustrates the life-cycle sales of these products. By the time steady repeat-purchase sales occur, the product no longer belongs in the class of new products.

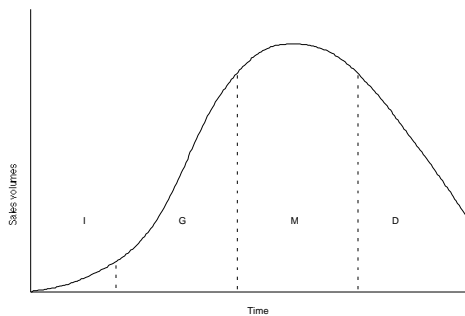
¹ Ph. Kotler, *Principles of marketing*, New Jersey, 1983.

chart II-2 product life-cycle sales for three types of products



Once launched on the market, a new product begins a life-cycle. The typical product life-cycle (PLC) is S-shaped and is marked by four distinct stages:

chart II-3 'S-shaped' product life-cycle pattern



Legend: I= Introduction; G= Growth; M= Maturity; D= Decline.

1. Introduction is a period of slow sales growth as the product is being introduced in the market. Profits are non-existent in this stage because of the heavy expenses of product introduction. There are different causes for the slow growth of many products. For many *processed food products* the following reasons are identified:
 - delays in the expansion of production capacity
 - technical problems
 - delays in making the product available to customers, especially in obtaining adequate distribution through retail outlets
 - customer reluctance to change established behaviour patterns.

In the case of *expensive new products*, sales growth is retarded by additional factors, such as the small number of buyers who can adopt and afford the new product.

In this stage, promotional expenditures are at their highest ratio to sales because of the need for a high level of promotional effort to:

- inform potential consumers about the new and unknown product
- induce trial of the product
- secure distribution in retail outlets.

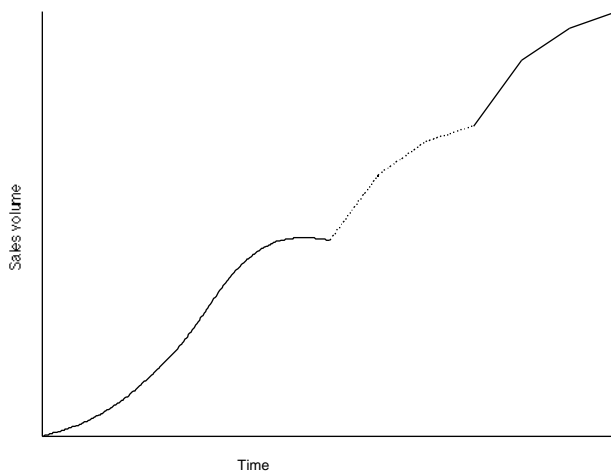
There are only a few competitors, and they produce basic versions of the product since the market is not ready for product refinements. The firms focus their selling on those buyers who are most ready to buy, usually the higher-income groups. Prices tend to be on the high side because e.g. costs are high due to relatively low output rates, and technological problems in production may have not yet been fully mastered.

2. Growth is a period of rapid market acceptance and increasing profits. The early adopters will continue their purchasing, and conventional consumers will start following their lead. New competitors will enter the market attracted by the opportunities for large-scale production and profit. They will introduce new product features and this will expand the market. The increased number of competitors leads to an increase in the number of distribution outlets, and factory sales jump just to fill the pipelines. Profits increase during this stage as promotion costs are spread over a large volume. The firm uses several strategies to sustain rapid market growth as long as possible:
 - the firm improves product quality and adds new-product features and models
 - it uses new market segments
 - it uses new distribution channels
 - it shifts some advertising from building product awareness to obtaining product conviction and purchase
 - it lowers prices at the right time to attract the next layer of price-sensitive buyers.
3. Maturity is a period of slowdown in sales growth because the product has achieved acceptance by most of the potential buyers. Profits stabilize or decline because of increased marketing outlays to defend the product against competition. This stage normally lasts longer than the previous stages. Most products are in the maturity stage of the life cycle, and therefore most of marketing management deals with the mature product. The slowdown in the rate of sales growth leads to intensified competition. Some of the weaker competitors start dropping out.

4. Decline is the period when sales show a strong downward drift and profits erode. The sales decline may be slow or rapid. Sales may plunge to zero, or they may stagnate at a low level and continue for many years at that level. Sales decline for a number of reasons, including technological advances, consumer shifts in tastes, and increased domestic and foreign competition.

Not all products exhibit an S-shaped product life-cycle. Another common pattern is the 'scalped' pattern, consisting of a succession of life cycles based on the discovery of new-product characteristics, new uses or new users.

chart II-4 'scalped' pattern



The PLC concept can describe a product class, a product form or a brand. Product classes have the longest life cycles. The sales of many product classes stay in the mature stage for an indefinite duration, since they are highly population related (cars, perfume, refrigerators). Product forms, like the dial telephone, pass through a regular history of introduction, rapid growth, maturity and decline.