# 'JUST IN TIME' PRICING STRATEGIES IN SERVICES: TOWARDS A CONCEPT OF 'CUSTOMIZED MANAGEMENT OF SERVICE SUPPLY'[1]

**Dr. Frédéric Jallat**
Professor
European School of Management - ESCP-EAP
79 Avenue de la République, 75543 Paris Cedex 11 - France
Tel +33(0)149232251
Fax +33(0)149232248
Email: jallat@escp-eap.net

**Dr. Fabio Ancarani**
Associate Professor
SDA Bocconi Graduate School of Management
Bocconi University, Via Bocconi 8, 20136 Milano - Italy
Tel +39258366510
Fax +39258366888
Email: fabio.ancarani@sdabocconi.it

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## Abstract

This article proposes a methodology based on capacity management and dynamic pricing strategies by questioning some of the traditional assumptions of Yield Management as they were first developed in the field of air transportation and extend the analysis to telecommunications and similar service sectors.

Bearing in mind that the influence of dynamic pricing is not limited to the sole optimization of short term revenues but also applies to operations management and to long term investment policy, the authors present and discuss the concept of ‘just in time’ pricing strategies which aims at reaching a better compromise between the capacity of a company and demand in an environment where services cannot be sold in advance.

In applying the concept to telecommunications, the authors then emphasize and demonstrate the strategic importance for a service company to have full command of its database and information networks and present the concept of ‘customized management of services supply’.

# Introduction

Yield Management and Dynamic Pricing are certainly two of the most innovative concepts in modern management (Weatherford and Bodily 1992; Cracknell 1995; Desiraju and Shugan 1999). As a direct consequence of the disruptions caused by the deregulation of air transportation in the United States during the eighties (Nason 1981), Yield Management emerged as an optimization system for capacity management in service activities such as air transportation, hotels, cruises, car rental companies, temporary work agencies and other service-based or Internet activities (Steenge, Tilanus and Winkel 1987; Coulter 1999). Yield Management applications have even been more recently extended to physical product inventory (Coulter 2001) or sales management strategies (Siguaw, Kimes and Gassenheimer 2003).

The influence of Yield Management is not limited to the sole optimization of short term revenues but also applies to operations management and to long term investment policy (Buhr 1982; Weatherford and Bodily 1992; Cote, Marcotte and Savard 2003). As such, Yield Management appears as a major strategic tool for the companies which want to boost their competitiveness on increasingly open and deregulated markets (Cracknell 1995; Maney 1995; Sahay, 2003).

Unlike standard marketing methods that stimulate demand, Yield Management tries to control it. It uses methods of risk analysis, and integrates micro-economic concepts which involve differentiated pricing approaches. It modifies the role of price from a determining variable to a discriminating variable (Daudel and Vialle 1989; Smith, Leimkuhler and Darrow 1992; Cote, Marcotte and Savard 2003).

This article proposes a new methodology based on capacity management by questioning some of the traditional assumptions of Yield Management as they were developed in the field of air transportation and extend the analysis to telecommunications and similar service sectors. It presents the concept of of ‘just in time’ pricing strategies which aims at reaching a better compromise between the capacity of a company and the demand in an environment where services cannot be sold in advance.

Besides, the research emphasizes the strategic importance for a company to have full command of its database in presenting the concept of ‘customized management of services supply’ which actually enables the company to preserve and develop its control over the final market as well as its global profitability.

# I. Literature review

The subjects of Yield Management and Dynamic Pricing are strictly related to that of price discrimination. Seminal works from Gabor and Granger (1966) try to investigate the price discrimination issue. Monroe (1973), by using the Adaptation-Level theory shows how consumers maintain latitude of price acceptance (LPA) around their reference price over which they are indifferent to price changes.

The term Yield Management originated in the airline industry to mean yield per available seat mile. The study of Yield Management problem in the airline industry dates back to the work of Rothstein (1971), which developed an overbooking model, to Littlewood (1972) for a stochastic, two-fare, single leg problem, and to Glover et al. (1982) for a deterministic, network model. Belobaba (1987, 1989) proposed and tested a multiple-fare-class extension of Littlewood's rule which he termed the expected marginal seat revenue (ESMR) heuristic. He asserts (Belobaba 1987) that Yield Management is a function of price and the number of seats sold at each price. Extensions and refinements of the multiple-fare-class problem include the papers by Brumelle and McGill (1993), Curry (1990), Robinson (1995), and Wollmer (1992). All of these authors develop static models of Yield Management, where decisions are made at a fixed point in time. Kimes (1997) gives a general overview of Yield Management practice in the hotel industry. He states that the term has been applied to other industries by altering it to yield per available inventory unit. Simply, Yield Management is the process of allocating the right type of capacity or inventory unit to the right kind of customer at the right price so as to maximise revenue or yield (Kimes 1989,1997). Ladany and Arbel (1991) study a problem of market segmentation for cruise liners. Bitran and Gilbert (1996), Liberman and Yechiali (1978) and Rothstein (1974) develop Yield Management models for hotels. Lee and Hersh (1993) use discrete time dynamic programming to develop optimal rules when demands are modelled as stochastic processes. Weatherford and Bodily (1992) and Weatherford and Pfeifer (1994) conducted a simulation of some of these rules for several models of customer arrival processes. Chatwin (1992, 1996) classified the study of airline Yield Management into three closely related areas: overbooking, discount-allocation, and traffic management, and used a discrete time dynamic programming formulation for the first two areas, and a continuous time formulation for the overbooking problem.

Subramanian, Lautenbacher, and Stidham (1999) analyze models with overbooking, cancellations, and no-shows with no assumptions on the arrival patterns of different fare classes by embedding the resulting problem into an optimal control problem of admissions to a queuing system. Talluri and van Ryzin (1998, 1999) develop an asymptotically optimal bid-pricing scheme for network Yield Management models. Gallego and van Ryzin (1994, 1997) and Bitran and Mondschein (1995) study the problem of dynamically pricing inventories with stochastic demands over finite horizons. Gallego and van Ryzin (1994) call Yield Management an attempt to synthesize a range of optimal prices for small, static set of prices in response to a shifting demand function. Recently, there have been various studies of pricing policies in the continuous-time Yield Management framework. In a two-price model that allows a single price change, Feng and Galleno (1995) obtain an optimal threshold control policy. Feng and Xiao (1998, 2000) generalize these results by incorporating analysis and multiple price changes. Feng and Galleno (1996, 2000) extend the model by assuming time dependent or Markovian demand and fares. Using the dynamic programming approach, Liang (1999) shows that a threshold control policy is optimal for a continuous-time dynamic Yield Management model. Zhao and Zheng (1998 a,b, 2000) reach a similar control policy for a more general airline set allocation model.

Highlighting its link with marketing, Donaghy, McMahon-Beattie, and McDowell (1995) consider Yield Management to be a 'revenue technique which aims to increase net yield through the predicted allocation of available (bedroom) capacity to predetermined market segments at optimum price'. In such areas as ski-lifts, golf courses, theatres, museums, visitor attractions, however, the potential to use Yield Management exists but has not yet been explored extensively (Anderson 1996).

Desiraju and Shugan (1999) provide a conceptual foundation for the strategic pricing of capacity constrained services viewing Yield Management strategies only as tools for implementing an optimal multi-period pricing strategy where each price is a function of forecasted excess capacity. In that respect, Yield Management Strategies employ a pricing strategy involving discounting early prices but reserving some capacity for later sale at a higher price. Their analysis shows that costly, complex multi-period Yield Management strategies are far more profitable when a service provider faces different market segments arriving at different times to purchase the service.

Today and thanks the Internet, dynamic pricing, once the domain of few industries, is now entering the worlds of mass retailing and services, both online and offline (Troelsen 2003). The advances in computer sciences and database marketing are facilitating this process of gradual expansion of dynamic pricing and Yield Management (Sahay 2003). The Internet is offering smart firms the opportunity of increasing their 'smart pricing' strategies (Sinha 2000): reverse auctions, negotiations and group buying are now available for this purpose. In this regard, marketers should be very gifted in avoiding the risk of alienating customers with non-smart strategies (Sinha 2000; Sahay 2003).

## II. Yield Management Applied to Telecommunications

**Yield management as a major strategic tool in service activities**

By introducing generalized access to markets and putting an end to fare controls, the deregulation of air transportation in the United States allowed the emergence of a large number of small companies with more favorable cost structures than the traditional large companies. These small companies made the most of this advantage by offering competitive prices and by increasing their market share at the expense of the 'Majors'. Yield Management was the best answer of the 'Majors' confronted with this unexpected competition; it also precipitated the death of the charter companies in the United States.
The main aspects of Yield Management reside not only in pricing but also in the relationship between market share and demand. Thus, Yield Management may be a powerful tool for capacity management:

1) Yield Management allows a company to take advantage of its under-capacity (when demand exceeds supply), while increasing its market share or protecting it from potential entrants.

2) In a situation of over-capacity, the need for revenue usually leads to a stronger competition. In this case, Yield Management may also be very useful to protect high income market share, while allowing the company to sell its surplus capacity at lower prices.

3) Thanks to this technique –and if its capacity matches demand- a company may become even more profitable than its competitors.

In service activities, capacity has to be managed so as to alleviate the difficulty of stocking. Standard methods of capacity management are used to deal with peaks and

troughs in demand. In this perspective, some authors (Daudel and Vialle 1989; Cote, Marcotte and Savard 2003).) consider four main management techniques:

1) The first method consists in limiting the number of customers who can be satisfied (airplane reservations, high-speed trains, hotel, and restaurant). The advantage of this method consists in offering permanent good quality service; but this limits the possibilities of development -in particular during peak periods. Moreover, reservations may create perverse phenomena such as 'no-shows' (whenever the customer doesn't show up).

2) The second method is to 'stock' the customer to match the real shape of demand (airport shuttle buses, doctor's waiting room, hair dresser's parlor...).

3) The third method consists in downgrading the quality of service during peak hours so as to allow access to the largest possible number of customers (standing room for train passengers, extra beds in hospital wards ...). Of course, the negative impact of such practices on the image of the service should not be neglected.

4) The fourth method allows -by rendering information public- to adapt demand to the available capacity (road traffic information centers, truck bans on certain days ...).

These traditional procedures of adaptation of supply to demand only partially make up for the dysfunctions brought about by the impossibility of storing services.

The person in charge of marketing must try and regulate demand by other means than those described above, and in particular by a pricing policy which is not directed by the same criteria as for tangible products (George and Barksdale 1974; Reichheld and Sasser 1990; Normann 1993; Desiraju and Shugan 1999).

The simultaneous management of price and capacity allows companies to deal with a demand which is no longer limited by capacity but determined by seasonal variations. To implement this (Brown et al. 1990), companies use pricing policies which are consistent with their objectives (fare supplements during the most attractive time slots, discounts for specific customer segments during certain periods…).

Nevertheless, this practice is not wholly satisfactory, as it relies on seat allotments which were determined at the beginning of the season, on the basis of the previous year's figures.

In this perspective, one often encounters 'waste' -defined as the loss due to a non-sale- or 'loss' -defined as the loss in a sale that could have been made at a higher price.

The main tools of Yield Management all contribute to the maximization of global income with constant capacity, that is to say with relatively fixed costs, taking into account the fact that generally, in the services sector, variable costs are weak in comparison with fixed costs (Irons 1994). Yield Management relies on the attractiveness of prices which will transfer customer segments from one service to another and match capacity 'just in time' with the largest possible demand.

Yield Management decisions focus only on the number of seats that must be sold at each fare level and on the opening or closing of certain fare classes. The system does not decide on the pricing structure but allows verifying the provisional impact of a new fare structure to signal the inadequacy of a fare class and to reveal the necessity of a change in classes (Lieberman 1993; Desiraju and Shugan 1999).

**The traditional requirements of Yield Management**

To be effective, Yield Management must meet certain criteria. Even if these methods may be extended to fields that are very different from air transportation (minor surgical acts, banks, discontinuous production processes…), the technical specificities and management constraints of each of these fields bear important consequences on the chosen methods of optimization and on the best process of implementing Yield Management.

In that respect, Weatherford and Bodily (1992) have pointed out the modelization difficulties involved. These are mainly due to the random character of demand, to the number of fare classes, to the phenomenon of dilution between fare classes and to the dynamic aspect of derived decisions rules.

According to some authors (e.g. Kimes 1989), the following elements affect Yield Management:

- Fluctuating demand,
- Limited supply or capacity,
- The possibility to sell a product in advance,
- The possibility to postpone a purchase,
- Independent segments, defined according to their price elasticity,
- Maximization of profit as a priority.

Considering these characteristics, Yield Management applies to service activities which are linked to tourism and leisure, like air transportation, railways transportation, hotels, car rental, and tour operating. The telecommunications sector, as we are about to show, partly invalidates the systemization of these principles and partly questions the modes of optimization of demand used in the fields we previously studied.

**Dynamic Pricing and the telecommunications sector: towards new modes of optimizing demand**

The telecommunications sector differs substantially from air transportation. It has specificities that must be taken into account from a managerial perspective:

1) Phone consumption is easy to postpone.

Apart from a few exceptions, phone consumption is less constricting than managing an air fleet, as the latter is subject to strong logistics and organizational constraints (plane

maintenance, availability of crew members, destinations offered...) as well as to constraints that exceed the strict context of transportation activities and concern the whole business (capacity of airport structures, travel agencies' marketing policies...). As a consequence, an airline company has far less freedom than a telecommunications company to smoothen its demand. Telecommunications operators are sometimes in a situation of partial monopoly in their distribution activity, and are thus not only freer, but also in direct contact with their subscribers: there is no intermediary between the provider and the consumer. Following the example of energy distribution companies which, by means of their meters (which can switch electricity on or off and measure consumption), keep full control of their 'command' function, telecommunication operators are permanently able to control, follow and direct the behavior of their customers, providing it is not too restrictive with them and lives up to their expectations. By imitating the model set by some electricity service providers' invoicing policy (peak period cancellation system for example), a telecommunications operator could easily restrict the number of calls during certain peak hours or, on the contrary, encourage telephone consumption during periods of low demand.

2) Capacity limits -traditionally the exception and not the rule with the use of satellites and the modernization of fixed network systems- now become more and more an issue in the field of mobile phones and the provision of services.

This highly profitable provision of services quickly develops itself and constitutes the most promising sector for the future. Capacity management thus becomes the operator's major constraint and (partially) the condition on which perceived service quality -as well as the company's global competitiveness- depends.

3) In the field of telecommunications, it is impossible to sell services in advance because the number of calls is hard to evaluate a priori by users and even more by operators.

Contrary to what happens in air transportation, this makes forecasts intricate. Services are sold 'just in time'. One of the main conditions for Yield Management -i.e. sales by anticipation- is strongly called into question in the field of telecommunications as well as in some other service activities (electricity supply, catering ...). The glaring absence of independence between segments -an imperative rule set by Yield Management specialists (Daudel and Vialle 1989; Smith, Leimkuhler and Darrow 1992; Cote, Marcotte and Savard 2003)- compels telecommunications companies to manage and optimize their capacity rather than their profits in a strict sense. The marketing implications of this are extremely important and affect the strategic approach as much as the operational implementation of Yield Management.

**The potential of Dynamic Pricing for telecom companies**

Telecommunications operators meet some of the above-mentioned characteristics:

1) Capacity constraints: of course, such capacity issues tend to disappear on fixed networks (introduction of optical fibers for transmission and ATM for switching). However, capacity constraints are a real issue for mobile networks where expert teams keep on increasing the size of their network in major cities to avoid (or at least limit) saturation during peak hours.

2) Purchases can be postponed during the day or even the week (most personal calls can be made in the evening or during the week-end rather than during peak hours of working days).

3) Some of the services that are provided by phone companies can be booked in advance. For example, a call to a booking number ensures the possibility of having a phone meeting at a scheduled time.

In the academic literature at least, examples of yield management are very often taken from the airlines or the hotel sectors. Telecommunications are rarely taken as an example. However, as we just saw, Yield Management could apply to the telecommunications sector as well. Why has this not been the case so far?

The reason might be that telecommunications companies have developed specific ways of achieving high yields which are different from those of airlines or hotels. The next section will try to explore this.

## III. Making it Work: Capacity Management in Telecommunications

Yield management can still be helpful to manage capacity-related issues and to maximize profits. In order to make the most of their existing network, telecom operators have to take into account the flexibility of people who are ready to postpone their calls in order to get a better deal. Moreover it appears that most residential customers are not looking for better quality or value added services, but for cheaper calls. So, telecom operators have to adjust their prices depending on the flexibility of users and on capacity constraints. If we want to be more precise, they will have to adjust charges to each type of user and to each area (destination of calls and/or area where calls are made).

In practice, this is done at three levels: global price, time modulation of price and consumer equipment.

**Network optimization**

When a marketing team tries to apply Yield management techniques in order to optimize the relation between market demand and capacity constraints, it has to be fully aware of the way infrastructure costs evolve. The key point is to avoid the 'peaks' that saturate the network. In order to find an optimum time pricing system, telecom companies use a model which may be considered to be similar to classical Yield management.

With such management systems, incremental costs become one of the key factors. In fact, Yield management almost requires a case by case analysis in order to be efficient. It means that if one wants to optimize profits, one also has to deal with the incremental costs evolution on a case by case basis. This may be easy when the evolution of costs is linear. However, if we look at mobile telecom networks, we may find we are far away from such a configuration.

Please, insert TABLE 1 here

If we add traffic to a mobile network, the incremental cost of the capacity expansion may face very different levels. This cost will depend on the existing network configuration. If we refer to a simplified theoretical mobile network architecture -not taking into account BSCs (Base Station Controllers), transmission networks (microwaves for example), and radio engineering issues (radio frequency planning) - the additional equipment required to transmit an additional unit of traffic may range from nothing to a complete Mobile Switch Center (MSC). And the associated costs (i.e., the incremental costs) are mentioned in the following table.

Please, insert TABLE 2 here

Table 2 shows how different the incremental cost can be -depending on the level of saturation of the existing network. Theoretical variation may cost from $ 0 to $ 2 000 000 for a similar capacity expansion. The non-linear evolution of the incremental cost of a mobile network underlines the risk -as well as the gains- that the introduction of a Yield management system can bring.

**Consumer equipment optimization**

In the last paragraph, we considered the company's capacity but it is also possible to optimize capacity at consumer level. For example, we can take the case of a family with children. It is well known that teenagers like to spend a lot of time on the phone. It

could be interesting for telecom companies to provide -even free of charge- a second phone with a separate line which could be dedicated to the children of the family. As in the traditional Yield management approach, two problems must be solved. The first problem is that people without children have to be barred from getting this free line (they could use it for a fax machine…) and the second is that one has to optimize revenue. A free line implies a cost on which the telecom operator would like to get a return. As a consequence, one should give a free line to families where the children have limited access to the family's phone because often kept busy by the parents. A way of doing this is to provide a free line to families with high phone consumption.

## IV. Spontaneous Demand: A Strategic Concept for Telecommunications

**Definition**

In the telecommunications, demand calibration is very important before one thinks of optimizing revenue -as it is the case for traditional Yield management. In telecommunications, the first step when implementing demand calibrating methods is to reconstruct the 'natural demand' curve (Ancian et al. 1996). It is obvious that an operator knows its traffic curve depends on the time of the day and on the day of the week. But this curve represents the demand which corresponds to the existing pricing terms. 'Natural demand' is the way users would phone if there were no price discrimination (peak/off peak hours, working days/weekends...).

**Estimate natural demand by using past changes in pricing or 'special offers' approaches (Ancian et al. 1996)**

The most usual way to extrapolate the 'natural demand' is to compare all the traffic curves before and after changes in rates. Historical data will give indication on demand elasticity (longer calls or more frequent ones) as well as on flexibility (ability to postpone some calls).

The problem is the availability of such data. Even so, can we compare them? And if these rates are too old, how can we take into account the way the users' behavior has evolved?

Another way to approximate natural demand is to remove existing pricing constraints, in order to make users free to communicate the way they 'naturally' want to. This is something rather easy to do for the telecom industry compared to other industries.

It is what British Telecom (BT) understood when they decided to launch ‘special offers’. In the late 90’s, BT proposed the following discounts to its subscribers:

- "Sunday special": every Sunday during two months, national calls within the UK were charged at the local cheap fare. As BT advertised: “this will mean that no matter where you ring in the UK, even if it's from Land's End to John O'Groats, it will only cost the price of a local cheap rate call”.
- "The BT down-under Special": price cuts for calls to Australia and New Zealand (on Saturdays, for one month only). This offer follows "the BT Euro Special", a similar offer for calls to Europe.
- "Double summertime" -also called "the BT Local Special": Twice as much time for the same price regarding off-peak local calls (during one month).
- "The BT North America Special": reduction for each call to Canada and the USA (every weekend during one month).

This was of course a way to face competition, to improve BT's image and to cope with Oftel Price Cap but it was also a good way to let customers give vent to their ‘natural trends’ of communication on these routes, and/or at these moments. The addition of all BT's ‘special offers’ provided a large panel of calls -either local, national or international (including Europe, the USA and Canada, Australia and New Zealand). It also provided related traffic conditions (close to a natural demand).

Moreover, it can be noted that BT conducted these experiments when its network had spare capacity. In other words, BT carried them out whenever the implementation of Yield management results could be efficient. Consequently, all these ‘special offers’ enabled BT to construct an approximate ‘natural demand’ curve in a nine months period only.

Besides, BT launched large advertising campaigns for each ‘special offer’. This was a way for BT to test the impact of its different advertising campaigns as a ‘warm-up’ before any full-scale Yield management implementation. As such, this ‘special offers’ system was both a quick way to construct a ‘natural demand’ curve and a useful test for advertising campaign impacts before setting up a complete Yield management system.

**Limitations due to network access**

Telecom operators have to be very careful when implementing Yield management (even a basic one). When an airline company can limit the number of ‘discount seats’ in order to secure a seat and provide a better service to the customers who can pay full-price, a telecom operator cannot easily prevent a ‘discount customer’ from connecting to the network. If Yield management can help telecom operators to optimize the benefits they can derive from an existing network, such a system however is more difficult to

implement in the telecommunications industry than in the airline sector because of the difficulty to control -or even refuse- network access to consumers.

## V. Yield Management, Dynamic Pricing and Relationship Marketing in Telecommunications: A Complex and Powerful Combination

**A complex consumer behavior**

As appears from previous descriptions, yield management in telecommunications consists in finding a good compromise between the natural demand of consumers and network capacity. In airline companies, compromise is struck between capacity and revenue. Where does this difference come from?

It seems that the explanation can be found in that an airline company is able to keep segments independent one from the other. In telecommunications, this is impossible. A lot of phone calls can be cancelled easily. That is the reason why it is very important to understand consumer behavior as good as possible. This is the case in any yield project, but in telecommunications this seems to be even more difficult. The difficulty stems from the complexity of the product and the fact that consumers are free to use the network or not.

**Impact on communication and promotion**

Until recently, Airline companies did not communicate much on their prices. Their fare structure is extremely complex and companies don't want all customers to know too much about it. This suggests that these companies know their customers' behavior quite well, and their yield and marketing policies try to influence it. On the contrary, telecom companies don’t know their customers' behavior very well. And this is one of the main reasons why their communication is very price-oriented. In fact, they try to reduce the great variability observed among customers and try to obtain a set of well-controlled behaviors.

**‘Customized management of services supply’: an application for mobile phones**

Thanks the expansion of information highways, it is now (almost) possible for telecom operators to communicate through a multimedia interface with each of their customers. Therefore, we may soon observe the emergence of a ‘customer yield management’ or, as we will name it later on in this article, a ‘customized management of services supply’ -the idea being to optimize profit by making each customer more satisfied in providing him with many customized services bundling.

An equivalent of this ‘customer yield management’ could be derived from selective advertising on cable television. The future digital architectures of television networks will allow customizing advertising to the consumer's taste. At the same time, advertising will becomes a better economic proposition for companies using it: they will reach their marketing target with increased efficiency. This system has to be implemented with a very efficient Yield management program: which ad has to be sent to which target consumers, knowing that the time during which consumers watch ads is very restricted.

If we refer to what was said previously, it appears that it is difficult to maintain total independence between market segments in the telecommunications sector given that each segment benefits from the same services (or almost the same ones). It means that network access control and individual real time Yield management systems would be necessary to improve the operator's performance decisively –especially on very profitable market segments. The operator could inform all customers about the price to pay whenever they would like to place a call. The price would depend on the ‘access category’ of the user. This ‘access category’ would take into account the type of customer’s subscription (Premium, Business, Low...). Class parameters could include various pricing tables and different types of periods (working days vs. weekends and/or peak hours vs. off peak ones...). The ‘access category’ could also refer to geographical segments.

In any case, access priority must be clearly defined for each level of subscription. In fact, the only way to have independent segments is to control access to the network. The Yield management system must be able to refuse access to ‘low users’ in order to enable ‘premium subscribers’ to connect to the network first.

Taking all these parameters into account, a mobile phone operator should use a network with a high performance information system. This system should provide data on each subscriber and on the state of the network everywhere, at any time so that when customers want to gain access to the operator's services, the Yield management system should decide whether it is possible or not. Then it should propose a price based on the level of saturation of the network between the caller and the person being called. The price could also depend on the characteristics of the customer (parameters relative to the range of subscription). The system may propose some alternative periods in the day for cheaper calls. This last point requires complex statistical data in order to predict ‘near-future’ levels of saturation. It also needs data on the customers' propensity to postpone calls.

Such a system may look rather utopist. However, there are today no major technological obstacles to build it. Before initiating any call, the current mobile phone network

consults databases which include the characteristics of the subscriber who wants to make a call. Network capacity parameters can already be found in the various switches. The network is able to locate the subscribers. It is also able to send information to the user when he wants to call -such as signal strength, location, as well as any other information which is available on the network management system. The only technical obstacle today is the implementation of a Yield management system which could be able to generate the right information on a real time basis. However, such systems already exist in the airline industry's GDS (Global Distribution Systems).

In such a context it appears that we could soon see the birth of a VPCS (Very Personal Communication System) if the huge problems of subscribers' behavior could be solved:

- How will users react if they do not have a clear vision of the price they will pay for a call?
- Direct on-line price evaluation for each call may make customers 'uncomfortable' with the VPCS. They may get the impression that they face a 'black box' which obeys strange laws.
- Can the characteristics of a new Yield management system ever be compatible with 'visibility' and 'transparency' requirements from the consumer?

**The problem of indirect demand: keeping a direct link with the customer**

Another limit to traditional Yield management implementation is that such a system requires a direct link to the customer. Customers must be aware of the services offered by a given operator and they must have an easy and direct access to them.

However -when keen competition occurs- each operator tends to optimize its trade structure. In this complex environment, new companies (intermediaries or brokers) are entering the market and offer to manage the users' complete needs. This is, for example, the case of COLT in London. COLT is connected to long distance operators (such as BT, Mercury, Energis or Worldcom) and chooses to connect its customers to the cheapest one on a 'call by call' basis (depending on the day of the week, time of the day, and destination of the call...).

The growing importance of intermediaries is not specific to telecommunications (Jallat and Capek 2001). Developing direct contacts with the final consumer is one of the most efficient long-term strategies in other sectors as well (Glazer 1991; Normann and Ramirez 1993; Ancian et al. 1996; Magretta 1998).

Such contacts will become so important in the near future that subscriptions could be given for free as the main goal of telecommunication companies will be the creation of huge databases and extended partnerships. As shown in Figure 1, this is already the case in the airline industry where some players are much more profitable on information brokerage or 'services bundling' than on transportation as such. Major players which

manage computer reservation systems and information centers (GDS) are indeed able to choose their 'service partners' and gain control over the final market.

Please, insert FIGURE 1 here

Given the fast technological evolutions in telecommunications, there will soon be a large increase in the number of providers which could pass through the phone to sell and promote their services. The main objective of operators will thus be to sell a customer access database to these service providers in order for them to promote as many 'packages' as possible (information services, tele-shopping, tele-education…) and increase their global profitability (Smith, Leimkuhler and Darrow 1992).
This new market and profit structure could lead to a new kind of yield management – a 'customized management of services supply' as we named it- as shown in Table 3.

Please, insert TABLE 3 here

Beyond the context of telecommunications, the current competitive environment actually compels companies to develop direct links with their customers (Reichheld and Sasser 1990; Peppers and Rogers 1993; Irons 1994) or, at least, compels the organization to force or convince its intermediaries to keep the 'umbilical cord' with the final market alive (Kay 1993; Jallat and Capek 2001). Examples like Benetton in the textile sector, American Airlines' Saber system in the field of tourism and air transportation, Dell in the computer industry show how the companies which are able to control commercial database and tap sophisticated marketing information dominate their market (Magretta 1998). A similar evolution arises in the field of telecommunications.

## Conclusions

Since the telecommunications –as well as some other service sectors- partly invalidates the systemization of some of the traditional assumptions of Yield Management and partly questions the modes of optimization of demand used in sectors like air transportation, we wanted to demonstrate and develop the specificities that should be taken into account from an academic as well as from a managerial perspective.
Bearing in mind that the influence of Yield Management is not limited to the sole optimization of short term revenues but also applies to operations management and to long term investment policy, we presented and discussed the concept of natural demand

curve which aims at reaching a better compromise between the capacity of a company and demand in an environment where services cannot be sold in advance.

We tried to show how telecommunication companies should adopt yield projects and demonstrated the strategic importance for a company to have full command of its database. Given the large increase in the number of service providers, the main objective of operators could be to sell a customer access database to potential partners. This represents a radical change in the nature of financial and information flows and leads to a 'customized management of services supply'.

Yield management techniques can help telecom operators to optimize the benefits they can derive from a subtle management of information networks and partnerships. However, such an approach is more difficult to implement in the telecommunications industry than in the airlines sector because of the difficulty to control (and sometimes to refuse) network access to customers.

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**TABLE 1**

**Costs Structure in Telecommunications**

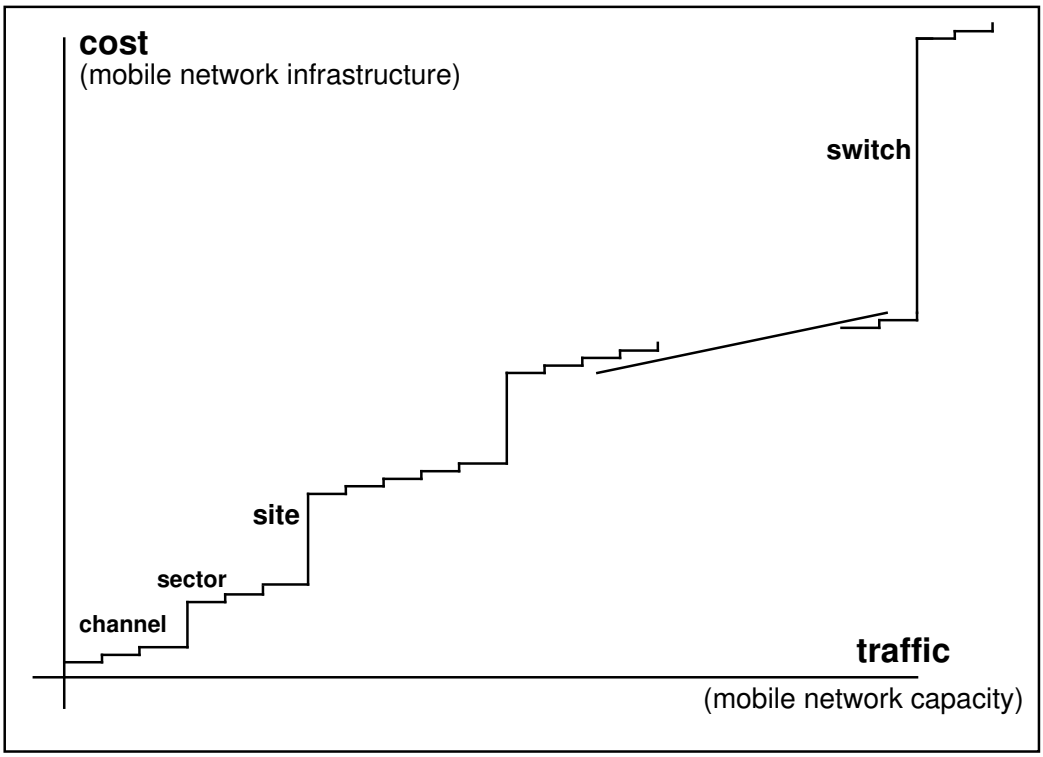


**TABLE 2**

**Incremental Costs for Additional Equipment**

| Additional equipment required | Direct cost |
|---|---|
| none | $ 0 |
| radio channel (TRX) | $ 1 000 |
| sectors | $ 60 000 |
| site and BTS (Base Transceiver Station) | $ 400 000 |
| MSC (Switch) | $ 2 000 000 |

**FIGURE 1**
**'Capturing' Profit and Value and Managing Information, Relationships and Services Bundling in the Airlines Industry**

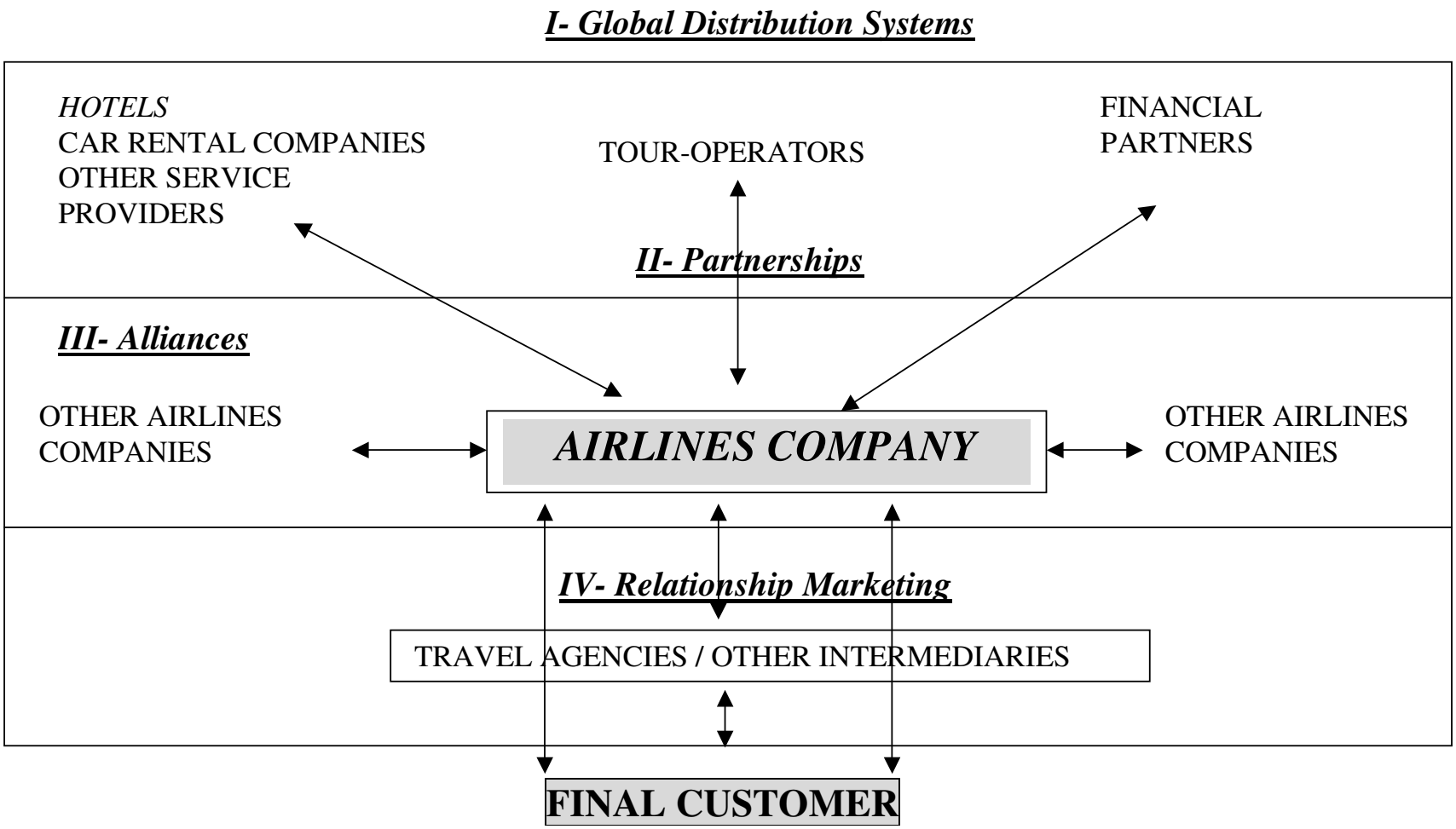

**TABLE 3**

**Traditional vs. New Yield Management Approaches**

| | **Ways of controling consumer behaviour** | **Main source of revenue** |
|---|---|---|
| **Traditional Yield Management** | Price range | Direct payment from the consumers |
| **New forms of Yield Management** | Customized management of services supply | Indirect pay-back from service providers |