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PRODUCER PRICE INDEX FOR SERVICES

THE FRENCH PPI FOR COMPUTER SERVICES

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Introduction

Investigations started in 2001 in France to build price indices for computer services. This sector of major economic importance is one of the most difficult to monitor. **Cooperation with the professional organisation proved to be exemplary in this field**. The professional organisation allowed INSEE to carry out test visits under excellent conditions, prior to selecting the method. Likewise, a quarterly meeting between the professional organisation and INSEE allowed progress to be discussed on a regular basis. Finally in June 2004 during four meetings organised by the professional organisation, INSEE presented the first values of the price indices. These meetings brought to light the possible next steps. Papers have been presented on this subject during previous Voorburg conferences : one in Nantes in 2002 on the subject of consultancy, studies and systems integration and two in Tokyo in 2004 on the subjects of software packages and facilities management. The aim of this paper is to sum-up the main points raised in previous years while providing a new angle, linked to more than two years of information collection and regular discussions with companies.

Industry output and scope of the paper

In France, nearly 35,000 companies specialise in computer services. They employ nearly 350,000 people and have an annual turnover of 40 billion euros. While these figures provide a good picture of the size of the sector, they should be read with care. They are probably underestimated, particularly due to the fact that the service part of computer manufacturers is not included. Some of the largest players on the market, such as IBM, only declare their turnover as a computer manufacturer and not as a service provider. Furthermore, the blurred dividing line between management consultancy and computer consultancy means that it is highly likely that some computer consultancy is included within management consultancy.

In the 2003 version of the French product classification, we can identify five subgroups on an initial level: computer consultancy, software development (standard software or customised software), data processing, database activities and hardware maintenance and repairs. The first two subgroups are by far the largest. Computer consultancy generates a turnover of more than 13 billion euros and software development 17 billion euros. Although less important, data processing services are continually developing through facilities management. Corporate clients are effectively outsourcing the management of their computer systems, including their software applications, to computer services companies. These figures should also be read with care due to the problems companies have correlating their activities with the current official classification.

Right from the start of this project, we noticed that computer services professionals did not actually fit in with the official product classification. Even though this presents undeniable problems especially for national accountants, **we have decided to draw up a specific classification for this survey**. We felt this was necessary to ensure good participation and good quality replies to this study. Following discussions with the companies, we chose this subgroups on an initial level : consultancy-studies-systems integration, technical assistance, software packages (production of standard software), facilities management (including third party

application maintenance), data entry and tabulating services, database activities, hardware maintenance and repair. The following table attempts to provide a link between the two classifications.

French Product Classification	Classification for price survey
Computer Consultancy	Consultancy - Studies - Systems Integration
Software Development	1) Software packages (for standard software only) 2) Consultancy - Studies - Systems Integration and technical assistance (for customised software) 3) Facilities Management (for third party application maintenance)
Data Processing	1) Facilities Management 2) Data entry and tabulation services
Database activities	Database activities
Hardware maintenance and repairs	Hardware maintenance and repairs

Without going into detail again (see the paper written for the 2002 Voorburg Conference), it seems that computer companies have problems differentiating between the consultancy phase and the studies-integration phase within a computer project. Consequently, **we will be able to calculate a deflator for the "computer consultancy + non standard software development" combination but it is very difficult to estimate a deflator for the computer consultancy subgroup**. Likewise, there seems to be an ambiguity regarding software maintenance. In most cases, computer services companies consider third party application maintenance to be an essential component of facilities management services, and not part of the "software development" subgroup.

This article will essentially only deal with the largest subgroups and/or those which pose the most problems. We will focus in the following parts on facilities management, software packages (production of standard software) and on the "consultancy-studies-integration-technical assistance" combination. On a more detailed level of the classification, we have identified for facilities management : infrastructure facilities management (hardware facilities management), third party application management (software facilities management) and global facilities management (hardware and software facilities management). For software packages, we have isolated the following products : application software, systems software, tools software, games software and software maintenance.

For software packages, we considered that a company should be included if it generated sales in this field within France. Thus Microsoft France and Oracle France come within the scope of the survey, even if the software packages are designed by their respective parent companies in the United States. On this matter, we are awaiting the conclusions of the international investigations on this subject.

Sampling and Weights

Like other surveys which relate to prices, the sampling base consists of the results of the annual business survey of services. In this survey, computer services companies must break down their turnover per product. For organisation reasons, we did not deal with all computer services at the same time. We worked first on data entry and tabulating services, then on consultancy-studies-integration-technical assistance, then on database activities and maintenance-repair, finishing with facilities management and software packages. This working method did cause us a few problems due to companies being incorrectly classified in the source used. A firm may, for example, declare a "non standard software development" activity in the annual business survey even though it is a standard software producer. The sampling principle remains the same: the largest companies are automatically selected and the others are chosen using a random sampling principle per stratum (company size and product).

Each company in the sample was visited by an INSEE field-officer when the survey was launched. The aim of this visit was to define a suitable method for monitoring and breaking down the turnover in accordance with the chosen classification. The weightings were therefore calculated using the information provided by the company to the field officer during this visit. The following table gives information about the sample used to monitor price changes within computer services.

Product	Number of firms surveyed	Turnover in million of euros	Weigthing in % of the 10 largest firms
Consultancy - Studies - Systems Integration and technical assistance	100	4 700	59 %
Facilities Management	47	1 800	75 %
Software packages	51	1 100	69 %
Data entry and tabulation services	38	670	75 %
Database activities	12	220	98 %
Hardware maintenance and repairs	23	323	80 %

Price setting

For the price setting method, we generally used what was written for the 2002 Voorburg conference in Nantes on the subject of "consultancy-studies-integration" (computer project) and "technical assistance" and the 2003 conference in Tokyo for facilities management and software packages.

The same method of pricing is used for **consultancy work, studies, and integration** as part of a computer project on the one hand, and for **technical assistance** on the other. We refer to **fixed price** (a set price) for a project and price per day for technical assistance.

In the context of a computer project, the computer company firstly fixes the salary cost price of the project. This corresponds to the salaries and contributions of staff assigned to the project and takes into account the (estimated) time spent by each person on the project. Obviously, the estimated time spent (from the point of view of specifications) is an important factor which makes it difficult for computer companies to invoice a fixed price. The other direct charges of the project, such as travelling expenses and logistics costs, have to be added to the salary cost price. Finally, to find the cost of the project, the computer engineering and maintenance company includes a share of the other charges to assign to the project. These other charges are, for example, infrastructure charges (rent on the premises used), the salaries and contributions of staff who are "non-productive" in terms of the project (particularly administrative staff) as well as valuation of the "non-productive" time of the productive staff (training, for example). To determine this share, the company multiplies the salary cost price by a coefficient. This coefficient is recalculated every year. Thus, the cost of a project can be written:

$$Cost = \left(\sum_i (s_i + c_i) \times tp^e{}_i \right) + ACD + QPAC$$

$$Cost = \left(\sum_i (s_i + c_i) \times tp^e{}_i \right) * (1 + COEF) + ACD$$

with the following notations:

s : salary, c : employers' contributions

tp^e : time spent (estimated)

i : individual taking part in a project

ACD : other direct charges of a project

QPAC : share of other charges

COEF : coefficient for determining the share of other charges

Moving on to the sale price of the project, the computer company applies a profit coefficient (called M) and a risk coefficient (called R). The risk coefficient is fixed after reading the specifications and also depends on the client's reputation. This coefficient is intended to allow for uncertainty about the estimated time spent on the project. Of course, negotiations will focus on the profit coefficient. We refer to set price invoicing as the client pays a set price without knowing how this fixed price is broken down.

The price of a project can be written thus :

$$\mathrm{Pr}\, ice = \left[\left(\sum_i (s_i + c_i) \times tp^e{}_i \right) * (1 + COEF) + ACD \right] \times (1 + M) \times (1 + R)$$

With regard to technical assistance, the method of pricing is similar although much simpler : there are fewer people involved, prices are set per participant, the time spent is not estimated but actually worked in the company (commitment of resources), the other direct charges are limited, no coefficient for risk is applied. The price per day per person employed represents mainly and almost exclusively the salaries and contributions of the person employed and the coefficients COEF and M. Technical assistance is therefore rather like the delegation of staff, computer service companies invoice company clients for their fees per day by type of qualification.

For facilities management, the price setting method is very similar to that used for a computer project. However, to estimate the cost of the facilities management service, the computer services company includes a large hardware cost part : for example, unit cost of managing a PC, unit cost of managing a server or computer application. We can therefore use the previous formula for facilities management.

$$\Pr ice = \left[\left(\sum_i C_i \times V_i \right) * (1 + COEF) + ACD \right] \times (1 + M) \times (1 + R)$$

In the previous formula, C represents the unit cost of the application base (e.g. cost of managing a PC) and V the associated volume (number of PCs involved). By expanding the notion of price per qualification to the notion of price per unit of work (personnel and hardware), we see that the price setting method is very similar between facilities management and computer projects. However, for very large facilities management contracts, the fixed price with costs per application base approach is used in addition to another approach: the client budget approach. In these instances, the client specifies its computer budget as well as its service level. The aim of outsourcing the computer system to a third party is to reduce the budget with equivalent services. A reduction percentage is often defined to be applied to the initial budget. The cost approach allows the service provider to estimate whether such a reduction is possible.

For computer projects and especially for facilities management, part of the price may depend on the results obtained following the computer service. The computer company and the client initially agree on measurement criteria and define a link between the price of the service and the values of these criteria. For price monitoring purposes, we have ignored this invoicing method since it remains marginal. However, it should probably be looked at in more detail within the next rebasing as it is becoming more popular.

In theory, **the software publisher** fixes the price of a software package to cover his research and development costs by estimating the sales of this same software package**.** In practice, this seems to be mostly empirical with no real modelling, apart from a few companies. At the end of the packaged software's life, the publisher takes stock – in terms of turnover generated – to find out how profitable the product is. Packaged software is in fact a product with a sizeable fixed cost (costs of research and development) but with a marginal cost of practically zero, negligible compared to the fixed cost. For the leaders in this market, prices are set at an international level and are usually the same within the euro zone, extending to Great Britain. If the parent company is in the United States, the "Europe" prices of course take the dollar/euro parity into account. Changes in the "catalogue" price of packaged software take into account the prices of competing products and a possible revised estimate of number of units sold. The frequency with which the catalogue price of a software package (for a given version) is updated is very variable: no update, annually,

every six months, every quarter or every month (the latter seems to be very rare). Packaged software is sold in two ways: direct selling and indirect selling**.** In direct selling, the product is sold to the end user and in indirect selling, to a retailer (distributor, specialist shop, another publisher, IT services company) who will sell the product (licence sale) to the end user. In the case of direct selling, the product is sometimes sold at its catalogue price, but not always. There is also the idea of negotiation and discount**.** We find negotiation when the publisher works more on a case-by-case basis than purely standard products. There is also negotiation for the most important business. In the case of indirect selling, the publisher applies a percentage discount to the retailer, mostly on the catalogue price. This percentage reduction depends on the retailer and stays the same over time, apart from special cases. It should be noted that retailers place an order with a publisher, in most cases, when the sale to the end customer is guaranteed, in order to cut down the risk. This may also explain why the percentage reduction can be applied to the negotiated price and not the catalogue price. With regard to maintenance (telephone assistance and product upgrade), the initial price is defined as a percentage which is applied to the catalogue price of the purchased product. This is valid for the first year of the contract. The price is then revised, on the 1st January or the anniversary date of the contract, according to changes in labor costs of the IT services companies measured by the professional trade union for this sector. This indexing seems to be automatic and not gradually negotiable.

Timing, estimated time and realized time

For computer projects and facilities management, two of the most important points to consider for price monitoring are the **"timing"** and the difference between **the estimated time** and the actual or **realized time** (or more generally, estimated volume and realized volume). A computer project can last from a few months to several years. There is therefore a large difference between the date on which the contract is signed and the date on which the service is provided. This problem is not unique to the computer world and we also experience it essentially in the fields of management consultancy and engineering. Ideally, we should measure the prices when the services is provided although the trend in price changes is more often perceived by companies when the contract is signed.

Due to the time delay between the signing of the contract and the provision of the service on the one hand and the uncertainties which relate to the project on the other, significant differences appear between the estimated time (or volume) and the realized time (or volume). When the client pays for a project, it is buying the target result of this project and the quality linked to this. If the time taken is greater than the estimated time, within a "reasonable" limit, the price is not revised and the value of the project for the client (and its quality) does not change. This is not (really) the client's problem, but instead the computer company's. The latter places a great deal of importance on its margin indicators which compare the price of a project (reference to the estimated time) and its realized cost, which takes into account the realized time taken. Company management indicators therefore focus more on project realized indicators, from realized time. This means that computer companies place a greater importance on their realized margin (for a project, for all projects in progress) and a lesser importance on their margin upon signing the contract (on a project, rarely calculated for all projects). It therefore seems that the theoretical requirements of the statistician when measuring the prices of computer services are contradictory: the market prices paid by the client (reference therefore to when the project is signed) are measured when this project is realized (implicit reference to the

time spent rather than estimated?). Furthermore and above all, these "theoretical requirements" are out of phase with the management tools of the companies.

Index methodology

Due to the price setting method for "consultancy-studies-integration-technical assistance" and facilities management, two monitoring methods can be favoured: model pricing and average price monitoring per qualification (or per unit of work). We have a great deal of problems in France getting companies to adopt the model pricing approach. They have trouble understanding the justification of such an approach, in relation to their day to day concerns, and deem the response burden too high. In theory, the model pricing approach has many advantages, in particular the fact that it takes productivity variations into account. However in practice, when we apply it to facilities management for example, we can see that its advantages are clearly reduced. It is effectively difficult for a company to estimate the variations of volumes associated to each unit of work, using a fictitious or completed contract. Hence, productivity variations are not taken into account. The model pricing approach thus becomes very close to the average price monitoring per qualification or unit of work approach.

We have therefore favoured the "**average price per qualification**" approach, either by asking the companies directly for the information or by calculating a turnover per hour worked. Naturally care must be taken when monitoring an average price for all qualification. This global average price monitoring can also be collected directly or by calculating turnover per hours worked or even (related approach) by calculating turnover per productive staff (or equivalent part time) and per activity rate. In facilities management, we can extend this average price monitoring to all types of unit of work : for example, average price of managing a server. We can also decide to monitor the prices which are given in certain client contracts. The following table summarises the approaches adopted.

Methodology	Computer project and Technical assistance	Facilities Management
Average Price per qualification (or per unit of work in the case of facilities management)	75 %	29 %
Average Price for all qualifications	19 %	33 %
Model Pricing		19 %
Contract Pricing	6 %	10 %
Another types of methodologies		9 %

Difficulties, quality effect

In conjunction with the chosen price methods, we are going to concentrate on the limits of the "average price per qualification" approach. The first point to note is that paradoxically, **we still do not know exactly how companies calculate average price per qualification**. Companies can calculate the ratio between the turnover generated by a qualification and the number of hours worked for this qualification. To do this logically, the companies surveyed need to calculate the time spent per project for each type of employee. However, there is still a problem with this: how are project prices broken down per qualification, in other words which grid should be used to break down the turnover of a project depending on the qualification? It is likely, but not definite, that the computer company uses estimated times per project and per qualification for this. It seems that in some cases, the company calculates the average prices per qualification by taking simple price averages for contracts signed in a given quarter.

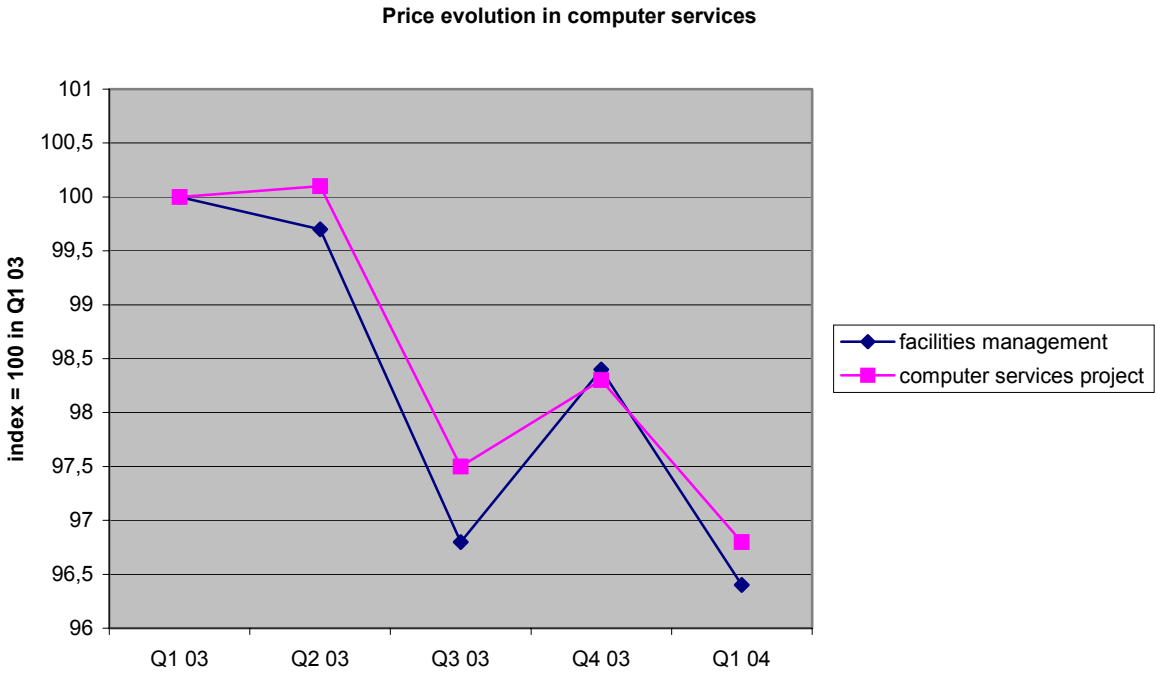
The price of a long project is not invoiced all at once but is perhaps paid in stages throughout the project. If the payments are closely linked to the time spent on the project, there is no problem. However, the client can decide to pay the amount in several equal parts: for example, for a project which lasts for one year, an amount equal to a twelfth of the price can be paid every month. In this case, price variations from one quarter to the next should be read with care (this is even more accentuated for a monthly collection). Following the presentation of index values to members of the professional association, we are going to work on a better understanding of the changes from one quarter to the next, with any **seasonal effects** being detected in conjunction with the analysis of the activity rate.

As we have already mentioned, the client does not really purchase the hours worked per qualification, but the overall result of a project. As each project is unique, we have decided to monitor the major component involved in drawing up the price of the project : labour force. This assumes that monitoring average prices per qualification, by weighting each qualification as a function of the weight it has within the productive staff of the firm, is a good approximation of an "average" project price. Hence this approach can be assimilated to the model pricing approach. Companies warned us that the qualification structure changes rapidly. Consequently, **we update our weightings in this field every year**. However, there is still a problem: can it be said that an average rise in qualifications results in better quality computer projects? Another point: companies told us that they sell many more technical skills than qualifications. The price of these technical skills follows a traditional U-shaped curve: the price is high when this technical skill appears (little offer of work on this subject), then this skill becomes widespread within computer companies leading to a price drop. Finally, the technique in question becomes obsolete but is still requested by a few companies with just a few providers on the market, hence a price rise with however a very low relative weight. How can this be linked to the prices per qualification? Another obvious limit of the "average price per qualification" approach naturally relates to **productivity variations**, which are not taken into account in this approach. We have not currently found a way of dealing with this problem. As with the prices, how can the productivity of the employees of a computer company who are working on different projects be measured when these projects are always changing?

For monitoring the prices of **software packages**, catalogue type price monitoring does not seem very relevant. Consequently, we have favoured an **average price approach**. However, this approach does generate some major problems. On the whole, software package producers do not calculate average prices and in some cases they decided to do this only within the scope of this survey. Calculating an average price is subject to two main errors. The unit price of a software application falls when the producer installs it on many of its client's work stations. Consequently, the variation in the unit price combines a price effect and an "average number of equipped work stations per client" effect. It should be noted that with one of the largest firms, we had to calculate a unit price per software package, assuming an average number of equipped fixed work stations. Initially, unit prices varied greatly in line with a volume effect. By neutralising the volume effect, unit prices appear much more stable and naturally in phase with the perception of the producer. The second error comes from the fact that a producer rarely sells just one software package but instead a suite of software packages. The suite in question depends on the client's requirements. In some cases, to calculate the average prices of a software package X, the producers take into account all solutions which contain software package X (the solution can be limited to software package X or contain many items). We can immediately see that we are not basing our calculations on a constant service.

Results

The following graph shows both the change in prices for the "computer project and technical assistance" part on the one hand and facilities management on the other. We can clearly see that the price trend is the same: a reduction by more than 3% over one year. The rise in prices in the fourth quarter followed by a large fall in the first quarter of 2004 probably conceal the seasonal effect which is linked more to the measuring method than to a real change in prices.



In some companies, our procedure led to some questions being posed. In particular, the people we spoke to believed that there was no point in calculating a price index for this industry as the professional association already calculated a cost index. The following graph clearly shows that this is not the case: the changes

since the beginning of 2002 are very different. This highlights the difficult period which computer services companies have just experienced: large price reduction (which reached 6% per annum by the end of 2003), a slight increase in costs and therefore a large drop in margins. Apart from the fact that we use this graph to prove that our procedure is well-founded, this shows the instability of the deflators used in the absence of price indicators in this industry. In France up until 2002, the deflator used within computer services was the cost index calculated by the professional association since no other sources existed. This graph clearly shows the importance of building industry price indices, essentially for the needs of national accountants. Despite the problems and limits mentioned above, **it seems obvious (for computer services companies too) that the new price index gives good trend information which will be much more relevant and appropriate than the previously used deflator**.

Price and cost evolutions in computer services