

# The Difference Between Software and Hardware and the Determination of Procurement Methods

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**Abstract.** Since there exists a big difference between computer software and hardware procurement, which cannot be simply subject to the procurement of goods according to OrderNr. 87. The operating environments of some software are special and not universal. Hence, the selection of our procurement method should be based on the features of the software and the needs of the user. Only through analysis and research to choose different procurement methods, rather than "generalizing" can we formulate scientific procurement documents.

## Introduction

As national informatization process is accelerating, there is increasing demand on various software, and government procure computer software on a regular basis. The Government Procurement Law and its implementing regulations, as well as the Order Nr. 87 of the Ministry of Finance, etc., have made a great number of regulations on government procurement, including procurement methods, issues with products of the same brand, and so on. Nevertheless, in the computer software procurement process there are still many problems waiting to be completely solved. Article 31 of the Order Nr. 87 of the Ministry of Finance has triggered concern about provisions for the bidder of the same brand products to be regarded as one bidder. Whether the procurement of computer software should abide by this regulations, or how to apply this regulation, determine whether the procurement task can be carried out smoothly. For this reason, we discuss how to choose a software procurement method as follows.

## The Most Common Problems in Software Procurement

### Software Function Requirements were Taken as Technical Parameters in Purchasing Software Development Technology

When making purchasing documents, people often put forward some technical parameters, which require the bidders to comply with one by one. And they even take them as scoring and deduction standards to facilitate the bid evaluation personnel to compare each items to determine whether the design meets the technological requirement.

But what should be pointed out is that these parameters should be product performance indicators that have been produced and already exist in reality. While at the time of software development, the product has not yet been produced and hence the technical parameters of the software do not yet exist and the technical parameters cannot be decided. Some people list each functional requirements of the software as parameters, demanding the supplier to reply whether they can keep them one by one. This is really not a scientific and practical way, suppliers will fully claim to keep them in the bidding documents, but it is not possible to evaluate whether they can really achieve it. After the result, all providers get full marks on these technical parameters, though it does not really reflect the technical differences of the developers, that is to say, these technical parameters are useless and meaningless.

### Inappropriate Procurement Method in Software Upgrading

Software upgrading requires a profound understanding of the key technology of the current software, and some software technologies are even implemented at the code level. Others can't fully grasp them only based on technical information, standard interfaces, source code, design architecture,

etc. provided by the original developer, at least they are unable to understand it in detail within a short time, since this is equivalent to a system analysis being done.

If the public bidding method is adopted, and the winning bidder is another technical service provider, the effectiveness of implementation may be greatly reduced, resulting in losses of the purchaser.

### **Specific Software also Requires Bids from Three Brands**

Specific software refers to software with special purpose or self-contained system, and its supporting file format is very special as well. Though there exist some mature software, they are irreplaceable, or similar products have less than three brands. For example Windows operating system only has one brand. There are various kinds of computer operating systems, such as WINDOWS, UNIX, and DOS, but their operating environments of the systems are different. Different computer system platform means different operation method and supported files are and mutual substitute can't be realized. Besides the operating system, many softwares also have their own features. For example, there are many image processing software, such as PS and iSee, both of which are dealing with image processing, but the processing technology and performance differ, so are the operation methods, for example some image files can only be opened with specific software. Therefore, the purchaser should pay attention that if the operating system or image processing software is purchased through open bidding, it could well happen that users who want Windows buy Linux in the end.

Thus it can be seen, the software purchase method is of significant importance. We ought to study policies together with procurement requirements and apply them with flexibility. We can't "indiscriminately" all require three brands to participate in bidding.

### **The Difference between Hardware and Software Procurement**

Before searching for the legal breakthrough point, we ought to first understand the differences between the features of hardware and software procurement.

#### **Problems and Solutions in Hardware Procurement**

Computer equipment with the same grade of hardware has similar performance parameters. For example, various brands of computers have similar screen sizes, memory, hard disks, and CPUs, It is therefore relatively easy to set deduction points according to parameters.

When purchasing computer hardware, the purchasing documents often set parameters in accordance with product of a certain brand and when evaluating bids, inconsistent parameters result in deducting points. This approach is universal, but it is neither scientific nor fair. First of all, it is inappropriate to set parameters with reference to a certain brand, since each manufacturer has its own description which cannot be exactly the same with others. Some people might claim that they refer to the product parameters of a certain brand with many proprietary terms being removed, so it is then fair. This is actually a fallacy, because different manufacturers used different words and expressions to describe their products, which can't be discovered by outsiders, but by other peer manufacturers at a glance. Moreover, this method of specifying parameters is not scientific. For example, a school plans to build a general-purpose computer classroom and proposes a parameter of computer CPU frequency greater than or equal to 2.3. Once a supplier's computer CPU is 2.2, his bid evaluation points will always be deducted. However, if we consider about it seriously, is the difference between CPU 2.2 and 2.3 really large in actual application? So we can say that in general classroom applications, this parameter difference is too little to be counted.

So my claim is that no matter what equipment is purchased, rather than equipment parameters, the purchaser should only provide functional requirements. Which is to say: what are we going to do with these devices. For example: we want to monitor a certain area of the school. Then the purchaser should provide a drawing of this region, asking the supplier to set a technical solution for you according to their own products, including how many devices are used, the performance parameters of each device, the goals to be achieved, etc. In the suppliers' solution, the number and grade of equipment used are even different from each other. Hence in bidding, we should study

their solutions, with the bidding evaluation experts reviewing their feasibility, merits and demerits, and multiple requirements to find the best one.

Another example is: we plan to build a computer laboratory for students so we just need to list the basic conditions of the laboratory building, the number of students it contains and the experimental content in the procurement document. As for which brand of computer to use, it will be evaluated by experts according to the bidding plan of the supplier.

### **Software Purchase Method Selection**

Software is special product, some of which are universal, and some are different. It is one of its features for operating interface and usage method to be "one of their own". I think there are roughly four cases in software procurement, namely: software development; upgrade and transformation; general software; special software, each of which has its own characteristics as well as methods of purchase:

**Software Development.** Public bidding shall be adopted for software development. It belongs to technical service, which means a kind of technology and service provided by the supplier to the purchaser. Since it is essentially the supplier providing "technical service", the supplier must also be familiar with the purchaser's business. The technology involved in procurement is not the difficult point, and many developers have the technical ability of software development as long as it is not too sophisticated. However, the developers can't easily master the business purpose of software. For example, for the development of a tax system software, the developers are required to be familiar with tax policies and work processes, and the system cannot be designed directly only by the purchaser who provides business requirements. However, being familiar with the business is not something that can be achieved in a short time. Even the staff working in the unit may not be able to fully grasp the business work, let alone the staff in the system.

Though all developers think believe they are capable of getting the work done, but after they begin, nothing could be properly achieved, their idea is always inconsistent with the buyer's. In the end, time has been lost in vain, leaving many problems to be solved and both the purchasers and developers suffer lost. As a result, they have to postpone the project or suspend it.

In the purchase of software development projects, from the view of competition, public bidding should still be adopted. However, there should be comprehensive consideration about the procurement documents to avoid the problems in the above examples.

As has been noted before, most software development technologies are not obstacles, but the business. The "functional requirements" of the software are the most important, but most users can't summarize and put them into words, which requires developers to conduct it. While it is more difficult for the developer to fully understand the user's business and process, and gradually formulate the task book. The business process of each industry is the knowledge and ability accumulated in the long-term work within the department. The longer the working time is, the more profound the understanding of the work is.

Developers should be familiar with every aspect of the work in the early stages, but the difficulty lies in coordinating. Users always advance a request from the perspective of use, and developers understand requirements from the perspective of technology. It is hard to fulfill the purpose when there is disagreement between the two. Only when the developer takes the initiative to consider from the user's perspective can the coordinating problem be solved. Many software developers tend to impose their own thinking pattern of programming on users, which they think is efficient and effective. But the user is not willing to accept any change to the process he is used or unhappy to learn something new. Once you disrupt his work steps, the user will not use or intend to use it.

For example: the design of a college enrollment management system. Developers must understand the process of enrollment and enrollment, since there are policy requirements for each process, such as the design of student achievement database, the transfer in the middle, the change of majors, and the retreat. You must understand the various policies involved, in particular, what data different users of the university require: the leaders want to see comprehensive statistics, managing staff need convenient data operation. In addition, you ought to provide different data report for different users.

Therefore, in the bidding, not only should the technical ability of developers be investigated, but also the understanding of business. These two key scores shall be set in the bid evaluation method:

One is to judge its business and technical capabilities by reviewing relevant performance.

Performance of the same type can reflect their technical capabilities, as well as their understanding of the requirements for the development of the system. There is a huge difference between those who have done before and those who haven't. If he has not done this work before, the credibility of his commitment is questionable, because commitment does not necessarily guarantee achievement in the end. If the project can't be completed in the later stage, it will result in irretrievable loss.

Besides, the relevant software qualification of developers, various qualification certificates of project team technicians, and work experience are the means to understand their technical capabilities.

Second, a business understanding and interpreting process in the bid evaluation is necessary.

This is mainly to examine its understanding of the development tasks, because it takes time to understand the business, unfamiliarity with the user's business may prolong the development cycle and increase the time cost. During the explanation process of the bidder, the tenderer can raise questions and judge his understanding of business process through his answers.

Please bear in mind that software function modules are not appropriate as scoring parameters in such procurement documents. Because it is no hard job to temporarily add some functional modules during the design of the software system and development process. If the functional requirements are considered as technical parameter requirements, according to procurement laws and regulations, developers can no longer add or reduce functional modules, but must implement them in accordance with the procurement documentation. However, in practice, in the process of developing a system, most purchasers add or reduce certain functional modules with varying degrees.

**Software Transformation should be Purchased by a Single Source.** Reconstruction and upgrading of software is to improve and add new functions on the basis of the original software, which requires a good understanding of the original data and technical construction, otherwise it cannot be performed. Although some buyers require technical documentation and source code after the completion of the original system, this does not mean that others can successfully implement the software upgrading. Technicians who are not the original developers, must first understand the various technical process of the system, as well as the purpose of each line of code, which could be counted as doing system analysis. It is known that there may be not enough people with system analyst capabilities. Secondly, it takes time for new developers to understand the business work or process, causing everyone to be dragged down and dislike this work.

At this time, with the original developer as the only one who mastered the core technology, only purchase by a single source is feasible.

**Public Bidding Method for General Software.** Some general software have the same functions, operation methods and supporting files. Such as: video playing software, antivirus software, data compression software, etc. The functions of different brand are basically the same, it is applicable no matter which product is purchased, so at this time, public bidding is feasible.

**Special Software should Allow Competition with Branded Products.** Special software has a certain purpose and system of its own, and the supporting files are "very specialized". For example, the operating system WINDOWS and UNIX and the software with own system and unique uses, other software can't replace it. Some people may ask how to classify image processing software, and whether many image processing softwares should adopt public bidding. In this regard, my opinion is that the procurement method is determined according to the needs, because there is no uniform standard for image formats internationally, and software developers may have their own image file formats. Most functions of the image processing software are universal but not all. If you use it for general purpose, it could be open for public bidding, and if it involves special purpose, it can only be purchased from a single source.

It can be seen that if public bidding is applied for all special software, it could be troublesome for the original users. And the problem will be even more serious when those who should purchase Windows get Linux instead.

## **Legal Issues in Software Procurement**

As special software has its unique feature, according to the above analysis, it can be seen that the most appropriate method for special software like operating system is inquiry procurement, competitive negotiation, and single source procurement, but it is not necessary to involve competitive negotiation because it is relatively simple. It must be clearly noted here that due to the special nature of this type of software, suppliers with the same brand of products should be allowed to bid.

It must be said that: Order Nr. 87 of the Ministry of Finance has set requirements on government procurement, of which Article 31 states that bidding for suppliers of the same brand products shall be counted as one bidder. However, we should notify that this regulation is most proper for equipment procurement, but not fully adapted to the purchase of software products. First, for this kind of procurement, no ready-made software exists to bid in advance, and each developer is an independent supplier, not to say the same brand issue; second, for special software, participation of three brands in competition is not possible, as in the previous example: some application software is based on the Windows operating system, hence it must be specified with Windows when purchasing the operating system, and even the version number should be clearly listed. In such case, it is unrealistic if we still require three brands to participate in the competition in accordance with the Order Nr.87.

On the other hand: public competition is the cornerstone of government procurement. In the procurement process, there is competition between different brand products, but is there no competition between suppliers of the same brand? There also exist competition among these suppliers in terms of technical capabilities, personnel quality, service quality and price.

Therefore, the Order Nr. 87 should be flexibly applied according to specific circumstances, rather than "generalizing" it. Software development and mature general software procurement can adopt public bidding; software upgrading and transformationsuitsfor a single source; mature specialized software suits for inquiry procurement, competitive negotiation, single source procurement, and allowing suppliers of the same brand.

## **Conclusion**

Different as hardware, software procurements should not simply be counted as service procurement with public bidding. Especially for some special software, which has relatively specialized and generally not universal supporting file formats and functions; it is not applicable for software upgrading as well. All has put high demands on us to formulate procurement documents. Some software is so peculiar that it is difficult to accurately classify it. In purchasing, you should thoroughly study the purchasing features, choose different procurement methods by category. Only under the premise of fully understanding and mastering the entire function of the software can we make a scientific procurement document. As long as there is sufficient reasoning and clear discussion, the choice of procurement methods could be allowed.

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