Applying Research On BD-Norlan Model Based on Big Data Analysis

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Abstract. The application of ERP platform is the main content of enterprise informatization. This paper from the enterprise user's point of view, using the method of Nolan model and statistical analysis of quantitative analysis of the combination of big data analysis technique based on the proposed ERP project in our country enterprise planning stage analysis of the level of information technology enterprise personnel data feasible BD-- Nolan model the theory of the strategic planning and operation of the technology, based on self-review, also from the perspective of computer system technology gives specific countermeasures to solve the various schemes.

Based on large data analysis of the Nolan model to solve the problem

China's supply side reform is the top-level design for the fate of the enterprise, its essence is to improve the level of manufacturing industry, the scale of industrial economy to intelligent manufacturing economy, the key point is to improve the level of information, the specific operation method is Internet plus application, technical route is enterprise application of ERP+ Internet, the key technology to improve the reasoning. The level of manufacturing enters is the efficiency and effectiveness of the application of ERP, but the ERP application level of state-owned enterprises is not high, has hindered the development of enterprise informationization, enterprises spend a lot of money but not rewarded. Small and medium-sized enterprises are more prohibitive. For the reason, but The following reasons:

One is the enterprise management of information technology aspects of the quality or whether to adapt to meet the enterprise application requirement of ERP. ERP is a typical human-machine system in an enterprise, all the staff of the information technology, especially the computer awareness and familiarity, determines the use of ERP range and depth of management personnel a computer is the quality of factors affecting the efficiency and benefit of enterprise using the ERP key.

The two is the ERP enterprise management system is a management information creation tool, as a system, it has its own rules, the basic premise is the enterprise information system (refers to the management system of ERP and the process) must achieve the same or similar, the most important in the practical application the agreement in two aspects: the data flow agreement and non-ambiguity of the two agreement for the data flow. It depends on academic issues, there are still companies and ERP who take the initiative to adapt to the problem (Nowadays there is a popular view in the reform of enterprise system at the same time, ERP the industry called two times development Comprehensive view, interested readers see the relevant documents); for the ambiguity of the two non-coincidental problem, relates to the internal benefit evaluation of enterprise management, the ambiguity of the two generally refers to the same kind of information management in the presence of a variety of different concepts in several departments, in the computer will cause two the system error, accidental stop, and
even lead to serious data problems in the collapse of the system, the non-ambiguity of the two is in the management of enterprises should as far as possible to eliminate the data inconsistency problems, through corporate restructuring, survey data and other technical methods to eliminate. But this problem is related to the understanding of the management idea and management the researchers, from the root. The present analysis is concerned with the quality of information technology for Managers.

Three is the benefit of enterprise investment, the behavior of all enterprises to profit for the purpose, to the enterprise information construction, the fundamental purpose of the ERP project also cannot do without profit, the ERP project enterprise means to input the number is not small, even very large funds for project management of course, the enterprise investment behavior, is required to have appropriate returns, enterprises can achieve the benefit of investment, operation effect depends entirely on the above two aspects.

In summary, key to the success of enterprise information transformation is the enterprise personnel in the use of information technology level, the standard has become a problem to be solved, on the other hand, decision-makers according to authoritative information on this aspect of the decision to invest in enterprise management informationization project of amplitude and amount. Although there are many theories in the academic on this issue, but most of them are as designers role analysis, as the enterprise itself, is still an urgent need for a standardized procedures, specific methods and operation model to solve this problem.

With the help of big data analysis technology, through modeling procedures and steps of science, put forward and Nolan model is closely related to the practical new model but also extended its denotation and connotation, for the convenience of narration, tentatively named BD Nolan model.

Application Principle of BD--Nolan model based on large data analysis technology

The question raised and related assumptions

In the process of enterprise information, there are many problems need to make a clear analysis and judgment, but the most needed, the most urgent problem:

Question 1, how to use quantitative methods to determine the current application of enterprise information systems - the overall level of ERP?

Question 2, can we find a standardized, simple and easy way for the enterprise itself, rather than by experts to determine the judgment to determine the size and size of enterprise information?

Question 3, can we make the enterprise ERP project is expected to put into operation after the efficiency problem?

In order to solve these problems, it is necessary to establish a systematic model:

Assuming statistical sample x for enterprise management personnel to use a computer and computer grade level range of its corresponding level was positively related to linear relationship can be taken as [0,1,2,3,4], 0 representative does not have the ability to operate the computer, use other values and the meaning of national computing ability to meet the requirements of the consistent machine level (please refer to the relevant readers references).

It is assumed that FP represents the measurement result of software function points, and it is assumed that the weighted method can be used to make the complex structure and the complex function points can be converted to the standard function point unit, and the comparability between the function points can be eliminated.

Assuming the continuity of the “3 σ rule” in Engineering, The random variables and their probability distributions are shown in Figure 1

\[
\begin{align*}
 p(\mu-0.67 \sigma < X < \mu + 0.67 \sigma ) &= 0.5000 \\
 p(\mu- \sigma < X < \mu + \sigma ) &= 0.6826 \\
 p(\mu-2 \sigma < X < \mu + 2 \sigma ) &= 0.9544 \\
 p(\mu-3 \sigma < X < \mu + 3 \sigma ) &= 0.9974
\end{align*}
\]
Assume that the threshold value of $X$ is in a unit sample space.

It is assumed that the distribution of the $X$ threshold in a unit sample space obeys the Yu Zheng state distribution, and its function is also a continuous random variable, which obeys the distribution of the Yu Zheng state and obeys the "3σ rule".

**Model analysis**

Based on the above assumptions, without excluding other factors influencing ERP software operation efficiency, only discuss the possibility of enterprise personnel because of their level of information technology and the ERP software can't even run the inefficient size, determine the effectiveness of the ERP software and the overall level of enterprise management personnel of the $X$ ($X$) the mathematical relationship between the distribution of interval further analysis can be obtained by using $X$ statistical parameters, and establish the corresponding Nolan model of the enterprise personnel in the process of using ERP habits, DB operation, Nolan model and error log data, so the enterprise can through the enterprise personnel information technology Analysis of statistics, quantitative determination of the degree of enterprise informatization at any stage of the Nolan model, as the basis of project construction and investment scale, eliminate the risk of implementation of informationization project enterprise fundamentally, targeted, scientific and enterprise information planning and construction, thus, this model needs to be discussed and the analysis from 4 aspects:

1) the concept and measurement of the effectiveness of ERP

ERP software is a typical management information system, method of measurement of it cannot do without the software, the software's effectiveness and reliability are two inseparable that the concept of software quality, in the field of computer, the effectiveness of software ($A(T)$ said) refers to the probability of software system in time of normal operation, and reliability ($R(T)$ said) refers to: in a prescribed period of time, according to the system specification probability of successful operation, apparently $R(T)$ and $A(T)$ is a function of time dimension, which belongs to the category of computer technology, already can fully meet the demand. For us to solve the problem of the two Concepts are not discussed in this article. Because ERP is a management information system, so it is a typical man-machine system. In the process of using ERP, we are concerned about the "human" level can enable ERP to run effectively? How much efficiency?, with terms of production and management is to make up the ERP project, which benefits. For specification purposes, we consider the ERP arising from the enterprise management level of computer application benefit is called the efficacy of ERP is denoted by $A$. In software measurement system, a measurement method called function point measurement method, from the software design Point of view, the functions of the software system is composed of relatively independent functional modules of different, its each function can be measured, and the function of the software can use the number of function points, expressed by FP functions (interested readers can read the relevant references). The ERP software, the function of the total FP has been fixed, the enterprises only need to study at the current level of enterprise personnel information technology ($X$) under the condition of the target ERP, the percentage of effective realization of function, can know the effectiveness of the $A$ ERP size, the total false function is FPT, the FPC function table It is shown, effectiveness is a function of the function point, namely $A(FP)$=
the mathematical formula to transform slightly, random variables and probability distribution using the axiom of the corollary: obviously the effectiveness of $A(FP)$ is a continuous distribution function of random variable $FP$, further said:

$$A(FP)=\int_{-\infty}^{fp}a(fp)d(fp)$$  \hspace{1cm} (2)

$fp$ is consistent with $FP$

According to the general laws of probability, we can assume that the function point $FP$ is approximate to the standard normal distribution, it can be inferred that the effectiveness of $A(FP)$ and the probability density of $A(FP)$ are subject to the "3 rule", in ERP software, according to the function of the degree of difficulty is different, can be divided into five categories: 1-input, 2-output; 3-query; 4-External interface, 5-a variety of external interface; interface design, in software engineering, in order to facilitate the planning, using the weighted parameter smoothing, using $FP=CT(0.65+0.01\Sigma Fi)$,where $CT$ is the weighted sum of these five types of function points, $Fi$ complex polygamo adjustment value 0.65, the coefficient shows that the complex function of ERP software accounted for about 35% of pre ERP software $FP$ value can be obtained by the design specification, so that we can directly use the $FP$ value to predict the effectiveness of ERP used in the future. For users, the effectiveness of ERP according to the structure and function of management personnel per cent forecast the enterprise makes the pre ERP software $FP$ is implemented to determine. Assume that $FP$ to% structure coefficient achieved for the R, according to the "3 rule" R is divided into six orders: 0 - 32%; 32% - 50%; 50% - 68%; 68% - 95%; 95% - 99%; more than 99%. The level of these functions to achieve the level of the ERP, and the Nolan model of the six stages coincide.

2) concepts and measurement methods of information technology for enterprise personnel

The enterprise personnel (including enterprise technicians) information technology refers to computer operation, maintenance, repair, innovation, comprehensive degree of programming ability, in accordance with the relevant provisions of the Ministry of education, enterprises can adopt two kinds of appraisal system, one is enterprise management and related personnel to participate in the national official held a computer test, to test results to determine the enterprise personnel's computer level; two is the qualified enterprises to establish the internal computer level assessment methods, the enterprise management personnel made equivalent to the corresponding national computer level certificate.

The level of the computer data obtained by the management of the enterprise to conduct a simple statistical treatment, summed up the level of the number of the number of levels of $f(i=0, 1, 2, 3, 4$= the level of the computer level / enterprise management personnel.

According to the relevant provisions of the computer grade examination at present, only 3,4 level personnel can handle complex functions using ERP, so also consider the statistics of 0,1,2 grade and 3,4 grade proportion relationship, the number of managers assume that the business of E, the number of research at all levels of computer grade $X_0, X_1, X_2, X_3, X_4$ the normal distribution of these data, the personnel department is measured. In order to facilitate the calculation, the need for X smoothing, eliminate incomparability, method is based on a certificate of personnel as the basic standard to people, represented by the $a=1$, 0 level coefficient The -1,1 level =2 ,2 level is 2,3 level=3,4 level =4, enterprise management staff of all levels of computer use -- the equivalent of ERP is equal to the number of times the weight of all levels of ability at all levels, i.e. $X=\Sigma xi *fi$, and E=$X_i*(-1)+X_i*1+X_i*2+X_i*3+X_i*4$, $fi=x_i *a/E$.

3) the relationship between the level of ERP and the effectiveness of the enterprise management personnel.

According to the 1), 2) the use of ERP software, pre enterprise effectiveness and enterprise management level of the computer approximately obey the normal distribution, and the effectiveness is a function of the function point, without excluding other factors influence the effectiveness of considering only one aspect of the computer management personnel of the enterprise level it is very
easy, it can be between X and FP there is a one-to-one relation, namely FP= kappa X, K is a constant, according to the relevant statistical inference, we can see that the relationship between A and X, which is the probability of effective enterprise management level of computer, the formula is:

\[ A(X) = \int_{-\infty}^{FP} a(x) d(x) \]  

(3)

4) Statistical significance of parameters

According to the formula, can draw a conclusion: the enterprise informatization level is mainly composed of the ERP level of ERP; the use level is decided by the effectiveness of quantitative indicators of size; while the effectiveness of ERP mainly depends on the enterprise management personnel's quality; enterprise managers cognitive level on the computer, there is a causal the direct relationship between the effectiveness of the application and the ability of ERP; national certification authority certificate and certification qualification certificate has been widely recognized by enterprises; the level of enterprise management structure directly determines the effectiveness of ERP; distribution effectiveness also indicates that enterprises currently available MIS The construction phase of the project (that is, which stage in the six stage of the Nolan model), the enterprise can determine the scale, level, form, project plan of the information construction based on the result of the inference.

The establishment of BD Nolan model

According to the above conclusions, the establishment of BD Nolan model, as shown in table 1:

<table>
<thead>
<tr>
<th>BD Nolan model</th>
<th>The proportion of persons computer certification (X/1)</th>
<th>(X3+ X4)/X</th>
<th>The order of the correspond Nolan model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;32%</td>
<td>---</td>
<td>A(x)=30%</td>
</tr>
<tr>
<td>2</td>
<td>32%&lt;X/E&lt;50%</td>
<td>---</td>
<td>30%&lt;A(x)&lt;50%</td>
</tr>
<tr>
<td>3</td>
<td>50%&lt;X/E&lt;68%</td>
<td>0---5%</td>
<td>50%&lt;A(x)&lt;65%</td>
</tr>
<tr>
<td>4</td>
<td>68%&lt;X/E&lt;95%</td>
<td>5%—35%</td>
<td>65%&lt;A(x)&lt;95%</td>
</tr>
<tr>
<td>5</td>
<td>95%&lt;X/E&lt;99%</td>
<td>&gt;=35%</td>
<td>85%&lt;A(x)&lt;98%</td>
</tr>
<tr>
<td>6</td>
<td>&gt;99%</td>
<td>&gt;35%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Based on BD - Nolan model of enterprise informatization practical application of standardized methods

In practical application, we can work out the steps:

The first step is to investigate and analyze the data of all the management personnel of the enterprise (including technicians) who have obtained the computer grade (or equivalent) certificate recognized by the state:

In the second step, X/E and (X3+ X4)/X were calculated on the control table.

The third step, refer to the table to determine the enterprise's information.

The fourth step, according to the conclusion of the development of enterprise information development strategic planning.

The fifth step, according to the specific strategic planning of the enterprise information work.

Enterprises in the BD - Nolan model should be adopted in different stages of technical solutions

In the different stages of the enterprise, should adopt different management methods to gradually solve the business problems, to avoid the application of risk information exists, in order to maximize the effective use of enterprise capital and valuable resources, and achieved good economic benefits and management efficiency.
In early stage, in human terms, the strength of education enterprise, training management personnel requirements of computer skills, enhance the ability of computer application itself in the specific time and obtain the corresponding qualification certificates; the deadline for business process reengineering in business management (BPR), especially to straighten out the enterprise data flow in the equipment; key management positions, allowing the purchase price of the provisions for installation of microcomputer, PC machine, office requirements of the deadline to achieve the internal computer; in preparation for the data within data, and put forward the position of the data dictionary (business process analysis).

(2) Spread stage, in addition to do in the initial stage of the work, also requested the deadline to achieve the job processing system in the typical post function management, realize the local computer business, such as financial and accounting management information system, material management information system.

(3) In the control phase, the central database management system is set up, and the planning of the system is presented. The key is the analysis and design of the central database management system

(4) In the integration phase, based on the central database management system, the paper proposes a specific physical system implementation scheme based on the established job processing system.

(5) The stage of data management, according to the new business enterprise continuously produced and new demand, the database system constantly to change to expansion and expansion, expansion plans and work, the main work is to expand the interface between the database and the external environment, using data warehouse technology, lay a good foundation for the enterprise to realize ERP.

(6) The stage of data management, according to the new business enterprise continuously produced and new demand, the database system constantly to change to expansion and expansion, expansion plans and work, the main work is to expand the interface between the database and the external environment, using data warehouse technology, lay a good foundation for the enterprise to realize ERP.

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