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SAMPLING: SPECIFICS OF BUSINESS PROCESSES ANALYSIS

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Abstract: Business processes analysis provides for obtaining accurate and maximally completed data by the method of sample survey, which is implemented on the basis of a representative sample. Further, the situation is generalized by the methods of statistical analysis that allow for the probabilistic occurrence of situations in business to be taken into account.

Key words: analysis, business process, methods of statistical analysis

The economic imperfection of market relations determines both the specifics of the relationship between the price and the quantity of goods produced or sold in the market, and the statistical technologies for collecting and processing data on this product.

Economic market excellence involves the sale of identical products at the same price. The equilibrium of the market may be disturbed due to:

the advent of a new product in the market or its collapse;

economic discrepancy between the difference in price for the same product and the difference in costs of its production;

buyer's ignorance of the availability of goods at lower prices, etc.

That is, there is a spread of prices even when identical products are sold at different prices at the same time.

In conditions of market imperfection, difference in prices arises due to the incompleteness of information received from business entities. In practice, price data is collected only for a sample of outlets. But, the change of outlets changes the average prices. If the average price reflects differences in the quality of the goods, then a change of an outlet will lead to a change of the average quality of the purchased goods and will affect its quantity, but not the sale price. Besides, it is impossible to identify the effect of the change of outlets. Therefore, when analyzing business processes, it is becoming increasingly important to obtain the most accurate data possible, subject to its maximum completeness.

One of the most flexible methods of data collection in modern analytical practice is a sample survey. The basic task of this survey is to describe as accurately as possible a population of interest based on a sample data with a minimum volume.

This can be achieved only on the basis of a representative sample, using such method of its formation that minimizes unintended errors.

If the accuracy of sample surveys results is achieved through the use of sampling methods, then its minimum size depends on many parameters such as the estimated indicator, the ways and methods of sampling, the variation of the initial data, the given reliability of the results obtained, the maximum admissible error in the evaluation of indicators and is determined as based on both the formulae of mathematical statistics, and the expert method.

To move from observation to the generalization of the situation under consideration, it is necessary to use the methods of statistical analysis. The calculation of probability allows to find out the reverse process - what data can be obtained based on the characteristics of the situation. If an event (economic activity, business process) is massive, then the probability can be considered as a measure of objective possibility of an event.

The probability of selection of each element of the studied data set may be different and vary in accordance with the objectives of the survey. The specifics of

the correlation between the price and the quantity of goods produced or sold in the market determines the basis for the formation of a sample population and, accordingly, the probability of each of its element's selection.

Thus, a product is not representative if its share in total costs is reduced; comparison of goods avoids the effect of changes in quality on price changes; price data and more often, it represents the offer price but not the actual sale price; he fact of influence of outlets change when collecting price information is impossible to identify.

Therefore, the probabilistic selection methods involve:

the mathematical probability of each element of the studied population to be selected;

the occurrence of a probability value above zero;

the quantitative calculation of probability.

In analytical practice, the formation of a representative sample is ensured mainly by the method of random sampling or stratification. But when analyzing changes in prices for a particular product to select outlets or goods, methods of improbable selection are mainly used.

This is due to [4]:

the impossibility of determining the basis of a sample,

the need for a long-term observation of samples,

the inability to use probabilistic sampling for both the reporting and the base periods,

minimizing a systematic sampling error,

the feasibility of making a decision on the formation of a sample at its lowest level.

Therefore, it is important to determine the population to be examined. It should cover only those units that will actually be given the probability of being selected for the survey.

If, in a stratified sample, each area has a known and non-zero probability of selection, which is unbiased and not a subject to a subjective opinion, then a sampling

according to the expert estimation (nonprobability sampling) provides neither a mechanism for non-zero probability of selection for each area, nor a calculation mechanism of probability of selecting those areas that are ultimately included in the sample.

Stratification significantly reduces the possibility of a biased sampling formation. When using nonprobability methods of estimation, the survey results will have an error. The scale of such errors, and sometimes their orientation towards underestimation or overestimation of the studied indicators will be unknown.

The accuracy of the estimates obtained is justified when using probabilistic sampling. This will enable users to evaluate the reliability of indicators that are being examined and to build a confidence interval for them. A compromise between an attempt to obtain a higher level of reliability and a desire to have a relatively small interval is achieved at a 95% confidence level.

For the correct construction of a confidence interval, the sample should be random, and the distribution of elements of the studied population follows the normal distribution law.

The desired level of accuracy of indicators will determine the size of a sample. The more accurate or reliable the survey results are, the larger the sample size is.

In economic studies, the sample size depends on such factors as [3,5]:

an indicator of variation of a studied sign;

the size of the marginal sampling error;

the size of the probability with which it is necessary to guarantee the results of the sample;

a method of selecting units of population.

Different combination of selection parameters of observation units allows to obtain different sampling methods.

Most of the methods of business processes analysis are combined. It does not require a complete list of units of observation, which reduces costs.

The big problem is the identification and processing of atypical observation unit’s data. Their inclusion in the sample set strongly affects the final value of the

obtained indicators and affects the quality of the survey results. Atypical units are defined as those:

having extreme values of indicators,

affecting the final score due to its large sample weight,

having a complex structure or which are in the process of structural transformation.

It is possible to identify and evaluate the impact of atypical units on the final value of indicators, which are examined using: the graphical method, when working with small volumes of the population; the construction of the median interquartile ranks of the boundaries of maximum permissible interval;

aggregated control of indicators at a higher level in the hierarchy of their processing.

In order to avoid the influence of changes in quality on price changes, the method of comparison is used in analytical practice. In the real economy, situations arise when new goods and old goods that are not in the current period may have price dynamics that differ from the price dynamics of the goods being compared.

To establish a connection between the previous series of prices observation for the old representative product and the next series for the new one, it is necessary to use the method of moment observations. The essence of this method is the examination of all elements of the population, but at a certain time.

The object of sampling during moment observation are moments or time intervals. Therefore, the concepts of general and sample population do not refer to the initial set of data that are being studied, but to the time of observation. The use of moment observation gives a good result when studying a part of individual elements of a process or their duration in a process.

Thus, the essence of using the selective research method in the analysis of business processes is to obtain estimates of the parameters of the initial population and to verify, based on a sample, the assumptions about the initial population. Sampling errors should be evaluated and provide users with the opportunity to calculate the reliability of the main survey results.

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