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Safety Economic Statistics and Statistic Index System

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Abstract. It is a significant research on the safety science quantitative, it can be enriched theories for safety science and it can promote the accuracy. The paper research on target, concept, means and system statistics index of safety economic statistics by basic theories about statistics and theories about the safety science. It is a significant research on promoting the management of safety.

Keywords: safety economic statistics, statistics target system, safety input, safety affection, safety benefit.

1. The Significance of Researching Safety Economics Statistics

Safety economics system is a complicated system, and statistics is a important way to cognate the safety economic system. We can analyze safe problem and understand the regulation of the accident by statistics for accident death, accident damages, input in safety and expedition. It can offer the guarantee for making safety programs, organization, management and condensation. The paper studies the target, concept, means and system statistics index of safety economic statistics by basic theories about statistics and theories about the safety science.

Quantitative research on safety science can be enriched theories for safety science and it can promote the accuracy, for example, it can promote the safety quantitative and accuracy for the safety science. The necessary and function is to promote the development of research on safety science quantitative. It is a significant research for safety design, safety survey, safety management. Based on the system of occupation safety and healthy management, the research should describe the regulation of safe produce and we should develop the method of quantitative to appraise the trends of safe produce. The safety quantity take on the analyze and research between the countries, regions and industry, For this reason, we need the comprehensive appraise target system to reflect the safety system. The theory provide the guidance for the government to manage the safety produce. The safety assessment, management system, safety attestation are required for the scientifically, comprehensive and quantity analyze by the Chinese government. The safety economic statistics is a subject to research the safety condition (safety, level of accident loss, safety effects and so on) and safety cost, safety labor.

It is a subject to provide the theory about designing and adjusting the safety system. It can offer some date about the disaster preventive technology, the development of safety management. It is a basis work to develop the research on safety economic, the found of safety economic statistics is the need of safety produce and safety technology. The research can raise the safety produce.

2. The Basic Theory of the Safety Economic Statistics

2.1. The study object of safety economic statistics

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The study object of safety economic statistics is the characteristics and relationship in number of the safe economic situation. Our society is a material world, different material movements will bring two results to our society: First, they benefit the survival and development of people. Second, they bring disaster to mankind. At a certain historical conditions, with the technology and economic constraints of old times, the amount of disaster (casualties and losses) is acceptable to some extent. The acceptable range is reasonably safe "degree" of the provisions, it changes with the development of science and technology capacity, to explore the law of variations is the core of safe economics and accurately to provide the number of signs is the essence of safe economic statistics[1]. The study of safety economic statistics is to use scientific methods to collect, collate, analyze the data and statistics of the reality of the safe economic situations, and with the adoption of statistical indicators and the indicator system, to show the size, level, speed, efficiency and ratio, etc. of safe economic phenomenon, thus it can reflect the specific role that safety development law plays in a certain time, place and conditions. Safety statistics can be divided into the following four categories: The first, by using the cross-sectional statistical data to reflect the size and structure of the overall distribution of the safe economic phenomenon at the same time. Second, by using the time series of statistical information to reflect the overall pace of development and changes in trends of the phenomenon of the same safety at different times. Third, to reflect the economic phenomenon or problems by comparing different safety statistics. Fourth, to forecast the scale and level of safe economic phenomenon in the future by using the history and current statistics.

2.2. The basic processes of safe economic statistics

The nature of the study object of Safe Economic Statistics determines the research methods of economic statistics. If there is not a set of scientific statistical methods, it is impossible to reflect the relationship in number of the safe economic situation accurately, timely, comprehensively, let alone reflect the safety development law. Safety economic statistics requires a high degree of broad masses of the collective work, under the leadership of a unified statistical authorities in the safety organizations, a task will usually be finished by the collaboration of many sectors, regions, units. The general links are as follows:

- The determination of the purpose and mission of safe economic statistics. The first step of economic statistics is to determine the purpose and tasks. we can determine the basic statistics which is needed when we research on the safe economic statistics in accordance with the issues raised by various periods of national economic and social development and the requirements of safe economic management and scientific research, has confirmed that those who need to study the economic spects of safety aspects of the basic number.
- The design of safety economic statistics. The design of safety economic statistics is to consider and arrange all aspects of the work, and the results of the design of economic statistics is to form the programs, such as indicators, classified directories, investigating and organizing project, as well as the guarantee of statistics and the provision of a variety of related systems.
- Phase of the survey. in accordance with the requirements of statistical programs, you can carry out the survey and collect adequate safety data, and it is the collecting process of economic statistics phase. The job is mainly to collect reliable and accurate materials of the related economic phenomena and finally to get a variety of sensible knowledge in accordance with the pre-determined outline of the investigation, so this stage is the starting point of recognizing things, at the same time it is the basic link to carry out further data and analysis.
- The arrangement of safety economic statistics. The stage of investigation has to be a scientific review of safety information, grouping and aggregation, so that the information can be well-organized and systematic. The main job of the stage is to do the following things based on the purpose of economic research: look through the gained information first, and then divide it in several groups to carry out a comprehensive summary of safety information, so that after processing the further scientific analysis on the information will be easier, so this stage is the middle link of the safety economic statistical study, it connects the previous job with the following one and it reveals the essence from the surface of the original information.
- Data analysis of the Safety Economics Statistics. It refers to analyze the datum after collection and integration, which include calculating various indexes according to various data, putting forward the

developing tradition and the proportion relation of Safety Economics, clarifying the character and the law of Safety Economics, and finally drawing a conclusion from the analysis. As the crucial phase, it emphasizes rational research.

- Data supply of the Safety Economics Statistics. Such Safety Economics Statistics institutions as Chinese academy of labor protecting science and technology are now collecting and integrating data more accurately, comprehensively and systematically, on the basis of which the Safety Economics databases have been built up. It can also used as the brainpower. Furthermore they have innovate the ways to supply the Safety Economics data and consultation service for the upper dept.

The research of Safety Economics Statistics is still on the way. Therefore the practitioners, researchers and the supervision dept of Safety Economics Statistics need make more efforts.

2.3. The methods of the Study on Safety Economics Statistics

- Safety target, is the parameter to describe the objective quantitative of the state or attribute of an object, it is usually provided as a work plan to achieve. Different objects or areas, have different definitions of the parameters. Such as safety production area, accident target refers to parameter or unit to describe the accident state or level, i.e. number of accidents, death tolls, mortality rate of ten thousand of people, mortality rate of tens of millions of tons of coal. Target is the parameter that has specific physical meaning.
- Safety production target system, is the integrated system to describe the objective quantity of safety production situation. Safety production target in general could be partitioned into accident status target and accident preventive target. Accident status target is absolute and relative quantum to record safety accident situations, i.e. mortality, number of accidents, mortality of one thousand people, injury frequency of million working hours. Accident preventive index is the level objective to reflect preventive accident measures, i.e. safety production rate, safety investment ratio, safety production professional people equipped rate.
- Index. Means the rate between the value's a thing in a certain period of time and the number of values' in another period of time in the same phenomenon as the standard for comparison. Economic index indicates the degree of economic phenomena change, i.e. production index, price index, labor productivity index. Besides, the ratio that describes area difference or plan accomplishment status is also called index. Index is a kind of non-dimensional relative comparison target, because it is intuitionistic, scientifically accurate, full of intentions, that can reveal and reflect the nature, comprehensive rule of an object.
- safety production index, is under the guidance of general exponent theory, based on the requirement of delineating the synthetical law of safety producing(accident), is a comprehensive quantitative target designed to reflect enterprises, industry or area safety production status. It has characteristics of non-dimensional, relativity, dynamical and comprehensive, could used to analyze and evaluate safety production status of enterprises, industry or government, thus to guide scientific decisions of safety production.

3. Safety Economics Statistics Target

3.1. Safety Economics Statistics collectivity、individual、symbol and target

- Safety economic statistics collectivity, collectivity unit. Statistics is reflecting the quantity feature including development scale、level、speed、proportion and effect and so on by statistics target. According to some objective and requirement, the overall things that statistics need to investigate is named as statistics collectivity. Every thing that is composed of collectivity is called collectivity unit or individual. For example, in order to know the allocating situation of safety full-time staff, collectivity is that all the safety full-time staff, the individual is that every safety full-time staff.
- Individual symbol and symbol exhibition. Statistics reflect the common name of attributes or characteristics. Such as safety investment scale, skilled personnel rate of enterprises, are targets to describe each enterprise's characteristics or quantum characteristics. Collectivity unit is the direct undertaker of symbol, symbol is leech on to collectivity unit. Symbol could be divided into quality

symbol and quantity symbol. Quality symbol is the target that describe the collectivity unit's quality characteristics, i.e. skilled personnel gender, protective equipment species, accident loss sort. Quantity symbol is the symbol that describes collectivity unit's quantity characteristics, such as safety investment amount, skilled personnel number, per individual protective equipment expense. Symbol exhibition is symbol's detailed exhibition in every unit, it has quality symbol exhibition and quantity symbol exhibition. Quality symbol exhibition uses written presentation. Quantity symbol exhibition uses quantity description, also called symbol value.

- Safety economic statistical collectivity character. Links collectivity, unit, symbol and symbol exhibition together, could generally conclude safety statistics into following chacters: First, massive, safety economic statistics collectivity is composed of many units, individual or few units could not compose into statistics collectivity. This is because the statistics research purpose is to reveal the rule of safety economic phenomena, and the rule could only be exhibited from general links of massive things. Second, homogeneity, collectivity homogeneity is the most important precondition of all statistics research. All units of statistics collectivity must have some kind of same nature to combine them together. The third, variability. Every unit that composes statistics collectivity must has one same symbol exhibition as the objective basis to conform the statistics collectivity/ But the other symbols that to be research must have variance phenomena. Collectivity variance is the result of anfractuosity effects of different factors, this determines that statistics method must be used to research this kind of variance phenomena. Collectivity variance indicates that collectivity homogeneity is only relative. Homogeneity is the precondition of statistics collectivity's existence, and is the basis of variance statistics research.

3.2. Safety economic statistics index

The mainly basic composition of the safety economic statistics index is index name and index value. The name of index is definite while the value of index is vary. The name of index reflect the mean of index the range of the index can be defined. The value of index in not some random numbers but is the comprehensive summarize, about the some individuals. The index is comprehensive and concrete. A integrated index contains form of expression, the period of index, the all that the index stands. For example, the total amount of investment by state-owned enterprise is 58.6billon. The investment is the name of index and the value of index is 58.6. the unit of index is billion Yuan, the form of expression about the value of index is absolutely number, the unit of index is billion Yuan, the period of index is 1989. The index represent the state-owned enterprise. Statistics are divided into absolute index and relative index.

- The aggregate amount target. It is reflect the total scope and level of safety economic phenomenon. It is named the aggregate amount target in safety economic statistics and it is absolute number. The aggregate amount target is absolute number and it has calculate unit(unit of material, unit of currency, unit of labor). It is the basis of compute the index and research. The absolute index contains the total amount, such as the number of enterprises ,the number of workers. The compute of the absolute target is not assembly, it must definite the essence of absolute target, such as the mean of index, scope of index. The index can reflect the scale and amount of safety economic. The input of absolute target contains: active input: labor insurance cost, healthy care cost and so on. passive input: compensate cost, maintain cost and so on. The effect of safety economic absolute target contains. negative effect: the loss amount of economic, the loss amount of workday, the total amount of the pollution of the environment. direct effect: the increase amount of produce and tax, the amount of loss and so on.
- Relative target. It reflect the level and quality of safety economic. It is a rate of the interrelationship between the phenomenon and process. For example, the index of input in safety measure, the increase index of input and so on. The relative index is a derivative index from the absolute index. They can be reflected by means or absolute number. The basis of contrast is different by the purpose and task of research, so the relative index is different. The common relative index is planning amount, structure relative index.

The relative index of safety economic is the amount of characteristic about the safety economic by some background, and it is constantly and objectively. In practice, we analyze and describer problem by the

relative index. Thus, we line the main index relative index when we design the system of safety economic targets.

4. The Statistics Target System of Safety Economic

We should form a rational target system to reflect the each parts of the safety economic and the all process of it. The system is different from the common statistics index system, we combine the peculiarity of safe produce. The system is a total thing that each part is related. It can describer the relationship of each sides about the safety economic. The relationship about the safety economic is diversified and the relationship between the statistics index is also diversified. The macroscopic and the microcosmic appearance can form some index system, showed in Table 1.

Table. 1: Safety targets and Safety target structure and details.

Macro-synthesized target	● safety investment qualified rate: safety-skill staff manned qulified rate, safety personnel manned rate. ● safety investment index: change fee laid investment index, gross(product)output value laid investment index, gross(product) output value safety investment index, Gross (product)output value safety cost index, gross(product)output value safety burden index, national income laid investment index, national income safety investment index, national income safety cost index, national income safety burden index. ● safety input growth rate: laid fee growth rate, safety investment growth rate, labour safety necessities investment growth rate, proportion of project "three simultaneity"
Microcosmic target	safety-skill staff manned rate, per capita laid fee, Per capita labour safety necessities fee, per capita occupational disease diagnosis fee, per capita safety cost, per capita safety burden, special duty staff per capita laid fee, special duty staff per capita, safety investment
Macro-synthesized target	danger source(hidden trouble) rectified rate, casualties rate that reaches a set standard, economic damage rate that reaches a set standard, man-day damaged rate that reaches a set standard, environmental pollution rate that reaches a set standard, danger source(hidden trouble) extant rate
Microcosmic target	Direct loss and indirect loss ratio, economic damage critical degree, man-day damage critical degree, economic damage significant degree, man-day damage significant degree, man-day damage rate, per capita damage (per capita economic damage, per capita man-day damage)
Macro-synthesized target	● safety investment rate: population number protected by ten thousand laid fee, population number protected by ten thousand safety investment, per capita damage investment(compensating) intensity, investment intensity by ten thousand damage.● safety staff labour efficiency: per capita worker-protected number, per capita safety produce rate
Microcosmic target	● safety production cost rate, damage(casualties) rate in million production, damage(casualties)rate in unit production, damage(casualties)rate in million profit. ● safety cost reduced rate: accidents and injuries decreased rate, accidents damage decreased rate, safety cost, dropped rate, total safety burden dropped rate. ● safety project investment efficiency, investment recovery stage, benefit rate, investment effect coefficient

5. Conclusion

The above-granted safety economic target system is only one part that is basic and meaningful. On the one hand, different target combination will also produce new target, on the other hand, proof and evaluation about different problems during the practical work will require some more synthetical and complicated target. Therefore, the above-granted safety economic target is the only basic one, specific target would be designed and defined on the basis of special demand during the practical work.

6. References

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