



A Comparative Study of Power science and Technology Awards: Evidence from China and World

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Abstract. This paper summarizes the power science and technology award evaluation models from the dimensions of sponsor, award setting, evaluation mode and evaluation index. Based on the investigation of the evaluation methods of China's electric power awards, from the dimensions of award setting, review mode, reward system, evaluation indicators and other dimensions, the typical characteristics of domestic and foreign power science and technology award review models are summarized, the similarities and differences of domestic and foreign power science and technology award review models are comprehensively analyzed, and the excellent experience of the international power science and technology award review model is summarized, so as to provide ideas and references for optimizing the strategy of China's electric power science and technology award review model, and help the international influence of national science and technology awards continue to increase.

Keywords: science; technology; awards system

1 Introduction

The report of the 20th CPC National Congress points out that it is necessary to insist on the central position of innovation in the overall situation of China's modernization. Innovation is the first driving force leading development. As an important part of the scientific and technological innovation system, how to give full play to the role of science and technology awards to help China's electric power science and technology to realize the independent innovation ability is of great significance to the development of China's electric power science and technology. This study sorts out through the power science and technology award settings and typical evaluation modes of major international associations. It comprehensively analyzes the similarities and differences of domestic and foreign electric power science and technology award evaluation mode, and

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summarize the excellent experience of international electric power science and technology award evaluation mode, which offers ideas and references to optimize the evaluation mode strategy of China's electric power science and technology award[1].

2 Analysis of the Evaluation Mode of International Electric Power Science and Technology Awards

2.1 IEEE Prize

The Institute of Electrical and Electronics Engineers (IEEE) is a global, professional academic organization whose academic goal is to advance the theory and practice of electrical engineering, electronic engineering, computer engineering, and computer science. The IEEE professional society corresponding to power engineering is the IEEE Power Engineering Society (IEEE-PES). IEEE-PES cooperates with other professional associations of IEEE to jointly set up a variety of awards including Philips Award, Tesla Award and other awards under the sponsorship of internationally renowned power electronics giants, which has played an extremely important role in guiding the future development direction of power electronics and has played a significant role in promoting the development of the global power industry and power technology innovation[2-3].

IEEE Awards are mainly for individuals or small teams to judge, focusing on individuals or small teams that have made important technological innovations and management innovations in the development of the power electronics industry. The review body is mainly based on the Technical Field Awards Council of the IEEE Awards Board, and the IEEE Board of Directors participates in the confirmation, and the evaluation criteria focus on the contribution value and economic value of the candidate or candidate team in the field of power electronics.

2.2 The International Federation of Automatic Control Prize

Founded in 1957, the International Federation of Automatic Control (IFAC) is a global professional association of members of national organizations whose purpose is to promote the theoretical development and application of control science and technology in various fields. Its members are academic organizations related to automatic control in various countries, and currently include a total of forty-five national members, including China's Automation Society, the American Automatic Control Council (AACC) and the United Kingdom's Automatic Control Council (UKACC) are its members (IEEE) and the British Institute of Electrical and Electronics Engineers (IEE) are members of the American Automatic Control Council and the British Automatic Control Council, respectively) [4-6].

The IFAC Congress is held every three years and is mainly sponsored by internationally renowned companies such as SIEMENS, Bayer AG, MathWorks, Phoenix Contact, the German Science Foundation, Elsevier, and HELLA.

There are two awards with international impact issued by IFAC: The Industrial Achievement Awards of IFAC, and the Giorgio Quazza Medal of IFAC. The former

was established in 2002 as an IFAC award to individuals or teams for their significant contribution to the application of the control industry; The latter was established in 1979 to recognize individuals who have made outstanding contributions to the conceptual foundations of the field of systems and control. The winners of the two awards are selected and determined by the IFAC Major Awards Search Committee, and the awards are presented at the IFAC Conference, and the winners will receive medals, certificates and prizes.

3 Analysis of Domestic Power Science and Technology Award Review Mode

The China Electric Power Science and Technology Award was established in 2001 and organized by the Chinese Society of Electrical Engineering, which is one of the first approved awards for social forces after the reform of the national science and technology award work. The China Electric Power Science and Technology Award is judged once a year, and is divided into the Electric Power Science and Technology Progress Award, the Electric Power Technology Invention Award and the Electric Power Technology Figure Award. The total number of award projects is about 130 each year, and no more than 2 special prize projects. From 2016 to 2020, about 400 projects were accepted each year, and the number of awards was 115, 116, 135, 138 and 138 respectively. In terms of the scope of acceptance, the China Electric Power Science and Technology Award implements a quota recommendation system, which can be recommended by each awardee, national scientific research units and academicians of the Chinese Academy of Sciences and the Chinese Academy of Engineering in related professional fields. Mainly oriented to the society and the power industry, it rewards scientific and technological projects that play an important role in the scientific and technological progress of China's electric power industry and units and individuals that make important contributions to the progress of China's electric power science and technology. In terms of evaluation methods, there are five stages: pre-examination of expert network, preliminary evaluation of professional review team meeting (five professional review groups are set up: electrical primary group, electrical secondary group, hydropower group, thermal power group, nuclear power and renewable energy power generation group), review by review committee meeting, announcement of evaluation results and approval of award committee meeting[7-9].

The Electric Power Innovation Award was established by the China Electricity Council in 2018 to reward outstanding innovation and contribution to power science and technology achievements, including the Electric Power Science and Technology Innovation Award and the Electric Power Employee Technology Innovation Award, of which the Electric Power Science and Technology Innovation Award includes technical achievements, information achievements, standard achievements, management achievements and patent achievements. In the past three years (2018-2020), a total of 2198 awards have been awarded, including 31 grand prizes, 401 first prizes and 766 second prizes of the Electric Power Innovation and Technology Award, 118 first prizes, 304 second prizes and 578 third prizes of the Electric Power Employee Technology

Innovation Award (2019-2020). In terms of the scope of acceptance, all kinds of electric power enterprises, institutions and scientific research institutes can declare the achievements in the field related to electric power and falling within the scope of awards. In terms of evaluation methods, the Electric Power Innovation Award implements a graded review and publicity system, that is, formal review, preliminary evaluation, re-evaluation, evaluation committee deliberation, award review, award committee review and publicity.

4 Comparative analysis of domestic and foreign power science and technology award evaluation models

4.1 Similarities Analysis

They both play a positive role in the contribution of scientists. R.K. Merton, an American sociologist and founder of the sociology of science, proposed that the scientific reward system honors the first discoverer, and at the same time recognizes and affirms its contribution through the norm of evaluation of the scientific community, which is the real reason for the origin and formation of the scientific reward system. Through the power science reward system, on the one hand, the scientific and technological personnel who made original contributions in the field of electric power are recognized and affirmed, and on the other hand, more people are encouraged to respect the scientific norms of electric power, so as to make more contributions, that is, the social function of electric power science is strengthened. Therefore, the power technology reward is essentially a function enhancement system, which strengthens the original understanding function of power science through the constraint mechanism and power mechanism and promotes the development of power science[10].

4.2 Difference Analysis

Based on China's unique national conditions and systems, there are great differences between the evaluation mode of China's power awards and foreign power awards in terms of the number of awards, award objects, award forms and amounts, and evaluation methods:

First, in terms of the number of awards, foreign power awards usually take social forces as the main body of awards, and the number of awards is large, while China's power awards are basically dominated by industry associations, and the number is very small. Although the strength of China's social forces to set up awards is constantly increasing, there is still a big gap with foreign power awards from the perspective of the amount of prizes and the number of awards [11].

Second, in terms of award objects, the foreign power award focuses on the contribution and influence of individual scientific and technological workers, and awards the award to individuals as much as possible, and attaches importance to the cultivation of young talents. For example, the National Science Award and the National Technology Award are all individuals; The Japan Pioneering Advanced Technology Award and the

Inoue Award are awarded to young scientists with great potential and who are on the rise of their scientific and technological careers. Most of China's power awards are awarded to scientific and technological projects, such as China's China Electric Power Science and Technology Award, Electric Power Innovation Award, and Energy Innovation Award are all awards for projects, and the number of winners of each project is several or even more than 10.

5 Conclusion

There are great differences between China's power science and technology awards and foreign power science and technology awards in terms of the number of awards, award objects, award forms and amounts, and award scope. The project systematically sorted out the setting of electric power science and technology awards in some international organizations and typical countries, comprehensively sorted out the situation of China Electric Power Awards, and comprehensively analyzed the different points of domestic and foreign power science and technology award evaluation models from multiple dimensions. In terms of the number of awards, foreign power awards usually take social forces as the main body of awards, and the number is large, while China's power awards are basically based on industry associations, and the number is very small. In terms of award objects, foreign power awards will be awarded to individuals as much as possible, paying attention to the cultivation of young talents, while most of China's power awards are still awarded to science and technology projects, and the number of winners of each project is several or even more than 10. In terms of the form and amount of awards, foreign power awards pay more attention to spiritual rewards when setting up science and technology awards, while China's science and technology awards focus on material awards, and the intensity is usually larger. In terms of the scope of awards, there are many types of international awards in the foreign science and technology award system, and many of them also enjoy a high reputation in the world and have high influence.

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