Use of Expert Question Method in Evaluation of Technology Update in Industry

Narzillo I. Rustamov

Doctor of Philosophy in Economics (PhD), Senior Lecturer Academy of the Armed Forces of the Republic of Uzbekistan

Abstract- **This article discusses the use of the method of expert inquiry in the exchange of technologies in the enterprise of the silk industry. Based on the concordance coefficient, the consensus of experts was determined, and the decision to update the technology was scientifically and methodologically justified.**

Keywords: Modernization, technological renewal, method of expert survey, level of competence of experts, coherence of expert opinion, concordance coefficient.

I.   INTRODUCTION

Uzbekistan has developed industrial development programs, through which the issues of technological renewal of production, modernization and diversification of industry and further deepening of localization play an important role in the development of national industry. The analysis of economic reforms in recent years shows that the role of measures to modernize and technologically upgrade the economy on the basis of the achievements and successes is high.

As a result of projects on modernization of industry, technical and technological renewal in Uzbekistan, as well as the effective implementation of the program of measures to reduce energy consumption in the economy and social spheres in 2015-2019, the introduction of energy-saving technologies and an average of 10.6% reduction in the cost of products produced by large enterprises.

On the basis of programs developed for the modernization of industry, extensive attention is paid to the technical and technological re-equipment of leading industries, the transfer of production to modern standards, the use of cost-effective and efficient technologies. In this process, it is important to assess the effectiveness of technological innovations in industries, in which the application of new methods is an urgent scientific task. It is advisable to use the method of survey of experts in the assessment of technological innovations in the industrial sector of the country.

II.   LITERATURE REVIEW

An analysis of theoretical and practical sources on the subject shows that the expert survey method is used differently for different purposes. In particular, in the literature published by S.D. Ilenkova, L.M. Goxberg, S.Yu. Yagudin, the method of expert evaluation was used in making decisions on the replacement of production techniques. For this process, the degree of consistency of expert opinion was assessed and an appropriate conclusion was made on the introduction of new techniques in production, depending on its value [1].

The theoretical aspects of the expert assessment method are widely covered in E.Yu. Duisen's research, which describes in detail the goals and objectives of expert analysis, the formation of expert groups and the processing of data obtained by them. It is noteworthy that the author proposed a special inequality in determining the number of experts and took into account the level of competence of experts in the development of this inequality [2].

A similar study can be seen in the scientific research of T.Yu. Chernysheva. The author proposed his own formula for determining the minimum number of experts and included an alpha parameter in it. In his opinion, the values of this parameter vary between 0 and 1, and it reflects the content of the whole work. However, how this can be calculated is not clearly stated in this study. The author has given a relative preference to a hierarchical approach to expert evaluation and selection of experts [3].

In practice, many methods are used to assess the level of competence of experts. In particular, A.F. Garifulin used multidimensional index methods to assess the level of competence of experts [4], while A.N.Anoxin used the arithmetic mean value in assessing the level of competence of each expert [5].

T.V. Uchaeva proposed to use the method of evaluating the opinion of experts to determine the impact of factors on the development of production in industrial enterprises [6].

The issue of assessing the level of qualification of experts is also the subject of scientific interest of Uzbek scientists. In particular, N.D.Suyunov, N.A.Ignatev and Sh.F.Madrakhimov proposed special methods for assessing the level of competence of medical experts. They focused on category and relevant score indicators in assessing the level of competence of specialists [7]. Also, theoretical and methodological foundations for the development of textile industry were investigated by Ergashxodjaeva, S. J. [10] and et.al., features of organization of production at light industry enterprises and issues of applying of artificial intelligence in the textile industry were researched by Yuldashev N. [11],Tursunov B. [12;13;14;15;16] and others.

III.   METHODOLOGY

The advantage of the expert survey method is that if the possibility of quantitative assessment of economic events is insufficient and requires the formation of personal opinions about a particular process or object, this method is used and certain conclusions are made based on the opinions of experts (experts). [8].

Experts are leading experts in a particular field or field, who, within their competence, draw conclusions about a particular event or process. The essence of the expert survey method is the intuitive-logical analysis of problems by experts. The generalized opinions obtained as a result of the expert's work are considered to be the solution to the problem. The complex use of intuition, logical reasoning, and quantitative judgment allows for an effective solution to the problem. The application of the expert survey method focuses on the selection of the number of experts and the formation of expert groups, assessing their level of competence, determining the degree of consistency of expert opinions, processing data by experts and making specific decisions based on the results.

It is usually advisable to have 5 to 20 experts in groups. Sometimes this amount can be as much as 10 to 30. While a very small number of experts leads to unreliable results, a very large number of experts causes problems of an organizational nature. Therefore, it is recommended to use the following inequality in determining the required number of experts [2]:

$$m \leq \frac{3}{2 \cdot Q_{max}} \cdot \sum_{i=1}^{m^*} Q_i \qquad (1)$$

m* - total number of candidates, Qmax - the maximum value of the competency coefficient, Qi - i - the competence of the expert.

Sometimes the following formula is used to determine the minimum number of experts [3]:

$$N = 0.5 \left(\frac{3}{\alpha} + 5 \right) \qquad (2)$$

α - the parameter is the minimum level of expertise error, the value of which varies $0 < \alpha \leq 1$ in the range.

Expert assessments play a key role in assessing the level of competence of experts, and different methods are used to determine their level of competence. For example, it can be determined using the following formula [4]:

$$K_j = \frac{\sum (X_{ij} \times M_i)}{\sum (M_i \times S_i)} \qquad (3)$$

Kj - j - expert competency coefficient, Xij - j - by an expert, i - the value placed on the object, Mi - i - is the average value of the object, Si - i - is the sum of the values of the object.

The most important issue in the expert survey process is the assessment of the level of consensus of experts. This process is done by calculating the concordance coefficient. Based on the obtained values of this coefficient, appropriate decisions are made about a particular object or socio-economic processes. The method for determining the concordance coefficient is the same in almost all literature. However, the overlap of the assessments formed by the experts with respect to the object under evaluation or the socio-economic process complicates the method of calculating the concordance coefficient.

In the method of expert inquiry, the consistency of the opinion of the experts is very important, and if the degree of consistency of the opinion of the experts is high, then the results of the expert opinion are reliable.

In our study, we used the method of expert inquiry in making a decision on the replacement of production techniques in the silk industry. On the basis of the implementation of diversification measures in the context of structural changes in the economy of Uzbekistan, the main organization of the silk industry we are studying, the Association "Uzbekpaksanoat" was established, which diversified the agricultural and industrial sectors.

The Uzbek-Chinese joint venture Bukhara Brilliant Silk is a large enterprise with a worthy place in the country's silk industry. According to the Resolution of the President of the Republic of Uzbekistan dated March 29, 2017 No PP-2856 "On measures to organize the activities of the Association" Uzbekpaksanoat "on the basis of the joint venture" Bukhara Brilliant Silk " was found. The Bukhara Brilliant Silk joint venture greatly contributes to the development of the silk industry in the southern regions.

At the Bukhara Brilliant Silk JV, measures were taken to assess the level of technological innovation in the implementation of modernization measures and to replace the equipment in the weaving shop of the enterprise, using the methods of consensus of experts. In assessing the level of technological innovation, it is important to answer the question of how advanced the new technology is and how effective it is, and the advantages of the new technology were calculated using the following indicators:

   comparison of dimensions of old and new technologies:

R_1 and R_0 − length of new and old car;

G_1 and G_0 − new and old car width;

E_1 and E_0 − height of new and old car;

   power comparison:

V_1 and V_0 − the power of new and old technology;

W_1 and W_0 − productivity of new and old technology;

   service capacity comparison:

T_1 ва T_0 − labor capacity of the service.

The calculations were performed using the following formulas [1]:

$$\eta = |\eta_1| + |\eta_2| + ... + |\eta_n|, \eta .$$ (4)

here, η − the overall assessment of the level of renewal;

η_1 − the degree of update on the measurements, which is determined by the following formulas:

$$\eta_1 = \Sigma \left[\left(1 - \frac{R_1}{R_0}\right) + \left(1 - \frac{G_1}{G_0}\right) + \left(1 - \frac{E_1}{E_0}\right) \right];$$ (5)

η_2 − rate of renewal in terms of productivity:

$$\eta_2 = \Sigma \left[\left(\frac{V_1}{V_0} - 1\right) + \left(\frac{W_1}{W_0} - 1\right) \right];$$ (6)

η_3 − the degree of renewal in terms of work capacity:

$$\eta_3 = \Sigma \left[\left(\frac{T_1}{T_0} - 1\right) \right].$$ (7)

Once these indicators were identified, the level of importance of technology innovation was determined based on the consensus of experts. The results of the analysis will be reliable in cases of high consensus of experts.

The concordance coefficient is used to assess the degree of coherence of expert opinion and is determined on the basis of the following formula [9]:

$$W = \frac{12S}{m^2(n^3 - n)};$$ (8)

here, m – the number of rated options;

n − number of specialists;

S − the difference between the total square of the sum of the colors (layers) and the average square of the sum of the experts' estimates:

$$S = O - C/Ч$$ (9)

О – the sum of the squares of the total points;

С – the square of the sum of the experts' estimates;

Ч − number of specialists.

   The concordance coefficient is in the range 0 <W <1.

If $W < 0,3$, so The consensus of experts is unsatisfactory; if $0,3 < W < 0,7$, average; $W > 0,7$, the consensus of experts is high. The results of the calculation of the concordance coefficient of the experts in the modernization of technologies at the joint venture "Bukhara Brilliant Silk" are given in Table 1.

Table 1 Accounting for the consensus of experts on technology innovation at the Bukhara Brilliant Silk JV

R_1	R_2	R_3	The sum of the rows	The square of the sum of the rows
2	2	2	6	36
1	2	2	5	25
5	5	5	15	225
3	3	2	8	64
4	4	4	12	144
Total:			**46**	**494**

$$S = 494 - 46^2/5 = 70,8;$$
$$W = \frac{12 \cdot 70,8}{9 \cdot (125 - 5)} = 0,786.$$

The results of the calculations show that the consensus of experts on the replacement of technology in the enterprise is higher than 0.7, that is, the correct decision to change the technology in the enterprise.

Using the above evaluation methods, the Bukhara Brilliant Silk joint venture, taking into account the opinion of experts, replaced the GT-601 weaving technology imported from China with ITEMA R-9500 technology imported from Italy, which gave high economic efficiency.

IV.   CONCLUSIONS

Calculations for the silk industry in the country on the use of the method of expert inquiry in the assessment of technology innovation in the industrial sector will help to eliminate a number of uncertainties and difficulties in quantitative calculations.

The results of the analysis show that the level of consensus of experts on the scores in the decision to update the technology in the silk enterprise is high ($W = 0.78$), according to which the decision to replace the technology in the enterprise is well-founded.

REFERENCES

[1]. Innovation management: Textbook for universities / S. D. Ilyenkova, L. M. Gokhberg, S. Yu. Yagudin and others; Ed. S.D. Ilyenkova. - M .: Banks and exchanges, UNITY, 1997. - 327 p.

[2]. Duyzen E.Yu. Expert Assessment Method: A Guide to Action. Creative Economics, 2014, No. 2 (86). - 30 s.

[3]. Chernysheva T.Yu. Hierarchical model of assessment and selection of experts. TUSUR reports, No. 1 (19), part 1, 2009.

[4]. Garifulin A.F. Expert evaluation in developing an effective strategy. Handbook of an economist No. 8, 2013. - 4 p.

[5]. Anokhin A.N. Methods of expert judgment. Tutorial. Obninsk: IATE, 1996 .- 82 p.

[6]. Uchaeva T.V. Classification of factors affecting the organizational and economic potential of enterprises. // Modern scientific research and innovation. 2014. No. 10.

[7]. Suyunov N.D. Pharmacoeconomic analysis and optimization of drug supply to patients with respiratory diseases. Author's abstract of the dissertation of the doctor of pharmaceutical sciences. T .: 2017. B. 17-18.

[8]. Orlov A.I. Organizational and economic modeling. Textbook. 3 hours / A.I. Orlov. - M.: Publishing House of MSTU. N.E. Bauman. - 2009. Part 2: Expert assessments. - 2011 .-- 486 p.

[9]. Gubsky M.I. Methodology for assessing the state of development of logistics in the Republic of Belarus. Management Problems No. 3 (40) 2011. - 123 p.

[10]. 10.Ergashxodjaeva, S. J., Kyvyakin, K. S., Tursunov, B. O., & Ahmadovich, H. Z. (2018). Evaluation of textile and clothing industry clustering capabilities in Uzbekistan: based on model of M. Porter. Int J Econ Manag Sci, 7(439), 2.

[11]. Yuldashev N.,Tursunov, B. (2018). Applying of artificial intelligence in the textile industry as factor of innovative development of the branch. Бюллетень науки и практики, (4), 396-403.

[12]. Tursunov, B. O. (2017). PRINCIPLES AND FUNCTIONS OF MANAGEMENT OF PRODUCTION CAPACITY. Вопросы управления, (3 (46)).

[13]. Ortikmirzaevich, T. (2018). Distinctive features of organization of production at light industry enterprises. Zbornik radova Departmana za geografiju, turizam i hotelijerstvo, (47-1), 88-93.

[14]. Ortikmirzaevich, T. B. (2017). Improving logistics as main factor in textile capacity usage. Zbornik radova Departmana za geografiju, turizam i hotelijerstvo, (46-2), 44-52.

[15]. Ortikmirzaevich, T. B. [2017]. Principles and functions of management of production capacity. Journal of Process Management. New Technologies , 5(4), 61-68. doi:10.5937/jouproman5-15248

[16]. Tursunov, B. (2017). Role of Managing Industrial Stocks in Increasing of Textile Enterprises Capacity. Journal of Applied Management and Investments, 6(4), 260-266.