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ASSESSMENT OF CONSUMER QUALITY OF INFORMATION SYSTEMS ON SMALL BUSINESSES

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Abstract

Globally, consumer attitude and behavior have been changing due to developments of Information Technologies. On this case, assessment of service quality towards consumers is believed as a major feature of development for small business enterprises. This paper investigates assessment of consumer quality through information systems. Moreover, gathered statistical methods to make methodological review on quantity based investigation as whole. On this way, conducted theoretical observations concluded that information systems are major point of advancement. Last but the least, shortcoming and outcomes of the sector and learning area directs to further improvements and investigations at all.

Keywords: Assessment, consumer quality, information systems, quality control

INTRODUCTION

The role of the role of small business and private entrepreneurship in the economic reforms being successfully implemented in our country. All normative and legal acts on the creation and effective functioning of small business entities have been adopted and their share in the structure of gross domestic product is increasing. Nevertheless, innovation technologies play an important role in further developing and increasing the competitiveness of small businesses (Abdukarimov B.A, 2013; Akimov & Dollery, 2009).

One of the key factors in solving the problems of small businesses, improving the quality of their work and developing this field is the creation and implementation of an effective management system based on information and communication technologies (ICT). For this purpose, all conditions have been created in our country. Many managers of small business are convinced that their business processes need automation(Perraton, 2004).

Small businesses do not require substantial large investments, but provide the economy with an effective solution of restructuring problems, filling the market with goods and consumer goods. Small businesses make a huge contribution to the formation of a competitive environment in the context of limited financial resources. Nowadays, in light of the globalization of markets and the rise of competition, small businesses need a lot of information to make correct management decisions. That's why all market participants are constantly looking for information that will positively impact their business development. In order to effectively manage your business, you need not only know the internal and external environment of an organization(Akimov & Dollery, 2009; Anvardjanovich, 2017).

Globally, consumer attitude and behavior have been changing due to developments of Information Technologies. On this case, assessment of service quality towards consumers is believed as a major feature of development for small business enterprises. However, some technologies of economic sector, which may facilitate evaluation of consumer quality. Hence, our research shows that experiments can be conducted in a passive and active manner (Mishkin, 2007).

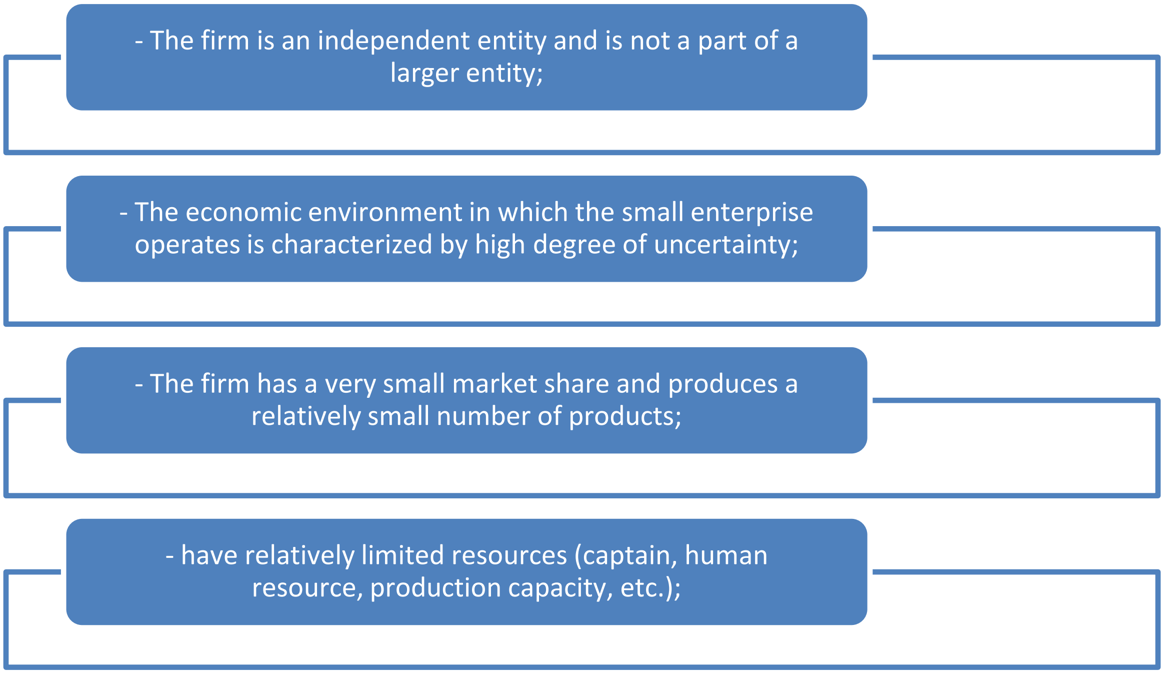
The passive view of the experiment is also subject to the passive monitoring of the object being investigated, for instance, when the object is in its normal state. The active view of the experiment is effected by the artificial effects of the object on a specific program. An active experience allows you to quickly and efficiently solve the research problems, but a large amount of material costs can be prevented and may interfere with the normal operation of the technological process. However, there is no serious obstacle to such restrictions on the active experiments on economic information systems (Hudaykulov, Hongyi, & others, 2015).

In the theory of experimental planning, the object of research is a "black box" scheme, which describes the exit parameters of the external access control effect. In our opinion, one of the main tasks of the experiment is to obtain mathematical models that represent quantitative relationship between the input and output parameters of the object. We are looking for a changeable input parameter.

THEORITICAL BACKGROUND

Small businesses play a major role in the social and economic life of industrialized nations. It is important to use a systematic approach to the identification of the specific features of the small business, which is characterized by the following stems (Figure 1).

Figure 1. Specific features of small business



In most cases, the companies do not form the management units of the entrepreneurs themselves. Hence, the majority of entrepreneurs' profits are derived from entrepreneurial income. In each case, the limit of its possible change is determined, it is continuous and discrete. It should be noted that factors in the active experiment should be controlled and independent. In general, experimental planning is carried out in several stages (Figure 2).

Figure 2. Influential factors on the experiment

• *Assignment of the subject (determination of the purpose of the experiment, determination of the initial condition, estimation of possible quantity of costs and means, determination of the type of the problem);*

• *Collection of unreliable information (obtaining publications, conducting surveys with experts, etc.);*

• *Selection strategy and method of solution (identifying model type and impact factors, identifying output parameters, selection of target function, definition of non-standard technical means, formation of statistical information, development of algorithm of experimental data processing).*

• *In a passive-looking experiment there are only controlled access factors that are not administered and the experimenter only participates as a passive observer.*

At the same time, issues of planning will be focused on solving the issues of optimizing the collection of information and selecting the quantity and frequency of measurements, choosing the results of the measurement results. In an active experiment, the ability to influence the progress of the processes, and the ability to select factors at each experiment.

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In the planning of this experiment, the issue of rational selection of factors affecting the research object is resolved and the number of experiments to be determined is also determined. All the factors that need to be met will need to meet the requirements that are consistent with each other.

The mathematical statistical problem solves the planning of EISs on active experiments, ie the choice of an experimental strategy in the uncertainty, processing the results of measurements, checking the hypothesis and making decisions. It should be noted that the choice of the mathematical model of the object is important, and usually polynomial approximation is used.

In a full-fledged experiment, the number of degrees of each factor is defined by the equality of two. When this condition is fulfilled, the number of *N* experiments is calculated as the following formula:

$N=2^n$, *(1)*

Here; n–quantity of factors.

The terms of the experiment are written in tabular form and referred to as scheduling matrices. Each column of the matrix is called the vector-column and the line is called the vector-series. If the number of factors is two, three phases of the transition from the smaller matrix to matrix matrix are applied.

When the first embodiment introduces a new factor, the combination of each level is based on the occurrence of two matrix markers when the matrix is small, ie a combination of the lower and upper levels of the new factor. Therefore, the initial state is descriptive, that is, the level factor plan is made and then it is returned to another degree.

The latter is based on a series of multiple columns of two columns based on the symbols, that is, one of the signs in front of one +1 gives a name to one, and -1 if no one is in the title. After multiplying by one, we get the x_1x_2 vector-column multiplication according to the original plan.

Then, the initial plan doubles by the number of tracks, returning to the previous initial plan (including column x_1x_2). Then, the first two layers are rebuilt, and the x_3 columns are added instead of the multiplication columns to the opposite of the x_1x_2 column. This practice is much more complicated than before.

The third attempt is based on the rules for the sharing of signs. In the matrix of 2^k experiments, the first column of marks varies alternately, the second column is followed by two, the third - after four, the fourth - after eight and so on.

The experiment planning matrix has four general features. Two of the peculiarities of the construction of the vector columns are the matrix construction rules.

The first feature - the symmetry of the experimental center is the following: The algebraic sum of the vector-column elements of each factor is zero, i.e:

$$\sum_{i=1}^{N} x_{ij} = 0 \qquad (2)$$

here; *j*–factor number, *i*–experience number, *N* –experiments number.

The second property is that the squares value of each column is equal to the number of experiments:

$$\sum_{i=1}^{N} x^2_{ij} = N \qquad (3)$$

The next two properties belong to the set of matrix columns.

Third: The sum of the sum of the members of the two vector columns of the matrix is zero, ie:

$$\sum_{i=1}^{N} x_{ij}\, x_{ni} = 0,\ j \neq n \qquad (4)$$

Fourth, the point in the planning matrix is that the value of the output parameters based on a mathematical model is the same distance from the experimental center and is not oriented. If the matrix contains these four properties, then it will be correctly shaped.

Let's consider the question of assessing the linear model coefficients, and the task of the experiment is to check the hypothesis of the model's adequacy:

$$y_u = a_{0u} + a_{lu}x_l + a_{2u}x_2 \qquad (5)$$

u index determines the true meaning of the unknown.

It should be noted that, since the experiment has a certain number of experiments, it is possible to estimate the models for coefficients after passing them:

$$y = a_0 + a_l x_l + a_2 x_2 \qquad (6)$$

After experimenting with unknown values, there are only coefficients a_0, a_l, a_2. We can construct a system of conditional linear equations for N experiments. The sum of the coefficients is determined after the solution of the small squares method:

$$a_j = \left(\sum_{i=1}^{N} x_{ij}\, y_i \right) / N \qquad (7)$$

a_0 we will give the average of the following expression to determine the:

$$\bar{y} = a_0 + a_l \bar{x}_l + a_2 \bar{x}_2 \qquad (8)$$

In this case, the matrix is symmetry $\bar{x}_l = \bar{x}_2 = 0$,

For this reason $\bar{y} = a_0$.

To determine a_0 the formula (7), the matrix xq is transformed into an expression, which equals +1 in all experiments. The above linear model will change, namely:

$$y = a_0 x_0 + a_1 x_1 + a_2 x_2 \qquad (9)$$

The positive correlation coefficients of x_{ji} are proportional to the impact level, and the negative ones are inverse proportional.

Research shows that the linear model does not always fully describe the subject of the research. In many cases, the relationship between the effect of the nonlinearity on each other and the degree to which they are interacting as a function of a full-fledged experiment. To do this we get a new column of two factor multiplication by multiplying the matrix columns one by one. As the $x_1 x_2$ factors influence each other, our linear model looks like this:

$$y = a_0 x_0 + a_1 x_1 + a_2 x_2 + a_{12} x_1 x_2 \qquad (10)$$

The greater the number of factors, the greater the relationship between them. In general, the level of relationships with each other is less than the number of factors. The sum of the coefficients is equal to the number of experiments assigned to the matrix. Different coefficients are independent of each other.

If the model is not only linear, but also other factors in the form of square, cubic, the coefficients are different. Thus, the factor of two-dimensional experimentation in the factor change allows to evaluate the linear effect. The fragmentary experiment maintains the full-fledged experimental features and occurs when the number of experiments is small. The following table shows the characteristics of a broken matrix (Table 1).

Table 1. Descriptive of Particles Matrices

Factors quantity	Broken matrix	Conditional sign	Experiments quantity	
			For broken matrix	for full factor experiment
3	$2^3$to 1/2 matrix	2^{3-1}	4	8
4	$2^4$to 1/2 matrix	2^{4-1}	8	16
5	$2^3$to 1/4 matrix	2^{5-2}	8	32
6	$2^5$to 1/8 matrix	2^{6-3}	8	64
7	$2^6$to 1/16 matrix	2^{7-4}	8	128
5	$2^5$to 1/2 matrix	2^{5-1}	16	32
6	$2^6$to 1/4 matrix	2^{6-2}	16	64
7	$2^7$to 1/8 matrix	2^{7-3}	16	128
8	$2^8$to 1/16 matrix	2^{8-4}	16	256

Our research suggests that the use of fragmented experiments will drastically reduce the number of experiments to generate econometric models (16 experiments instead of 256 in eight factor exponentials). It is desirable to use fragmented matrices to capture multi-factor linear models.

The processing of experimental results should be accomplished by three operations in the following sequence:

- calculation of model coefficients (regression coefficients);
- Check the model's adequacy;
- calculation of model coefficients (regression coefficients);
- To examine the importance of some regression coefficients.

Calculation of model coefficients is carried out on the basis of application of small squares method. For disproportionate testing of models, dispersion will be considered:

$$G^2 = \left(\sum_{i=1}^{N} (y_i - y_{im})^2 / f \right) \qquad (11)$$

here; y_i -*i*- real value of output volume as a result of experiment, y_{im} –in the model *i*- the value of the output size predicted in the experiment, *f* –the number of degrees, and the number of different experiments.

Each experiment represents the element of the uncertainty for the limited material being investigated. Performing experiments repeatedly (or parallel) does not give the exact results, because it always makes mistakes in experiments. The same mistakes should be assessed when performing parallel experiments. For this purpose, the experiments are carried out on the same basis and the arithmetic mean of all the results is determined by the following formula:

$$y = \frac{y_1 + y_2 + . . . + y_n}{n} = \frac{\sum_{q=1}^{n} y_q}{n} \qquad (12)$$

here, y_q–the results of a separate experiment; *n* –number of parallel experiments.

The differences in the results indicate variability, that is, the varEISion in the resettlement experiments. The dispersion will be used to measure this variable:

$$s^2 = \frac{\sum_{1}^{N} (y_q - \bar{y})^2}{n - 1} \qquad (13)$$

here, *(n-1)* – The number of free levels is equal to the minus one.

The greater the dispersion value, the greater the value of the experiments that are parallel to the greater the value.

It is important to exclude any errors that are excessive from experimental data, ie retries in the experiments. For this purpose, it is possible to check the dispersion uniformity by using various statistical criteria. In our research, we used Kohra's criterion, and if there are more than two comparable dispersions, then repeating experiments at all points. We estimate the criterion (criterion) according to the following formula:

$$G = \frac{s^2_{max}}{\sum_{1}^{N} s_i^2} \qquad (14)$$

Here, s^2_{max}–largest dispersion; s^2_i–the dispersion of each horizontal line of the matrix.

With this criteria f_1=*n-1 and* f_2=*N* depends on the number of free levels. The dispersion uniformity hypothesis is true if the experiment value of the criteria is not higher than in the table.

In this case, the center of the dispersion can be obtained and the optimized parameter must be calculated or retrieved by the experimental dispersion. The duplication of the dispersion is based on the following formula:

$$G^2 = \frac{\sum_{i=1}^{N} \sum_{q=1}^{n} (y_{iq} - \bar{y}_i)^2}{N (n -1)} \qquad (15)$$

Here, *N* –experiments quantity; *п* - parallel experiments quantity.

Moderate admissibility hypothesis can be calculated using the F criterion:

$$F = \frac{G^2_n}{G^2_y} \qquad (16)$$

here, G^2_y — *e*valuation of dispersion resuscitation.

The resulting model can be considered adequate if the value of *F* is not higher than in the table. If this condition fails, the model will be corrupted, the coefficients will be determined and their adequacy will be checked.

Some of the regression coefficients are tested by the *t-criterion* of Student:

$$t = \frac{| a_j|}{s_{aj}} \qquad (17)$$

All coefficients should be checked. Modifications are made based on the exclusion of minority factors as a result of inspections.

As a result of the experimental planning methodology, it is possible to conclude that their implementation algorithms can be implemented on an automated basis, which helps to assess the quality of information systems.

The first step in the experimental programming based on the issue is to select the type of database. Then, the user must specify the number of queries and control functional operations, and then specify the time it takes to perform and evaluate it.

Then the user will be able to choose the type of experiment, i.e. the full factor or fragmentary experiment, and then select the factors of the experiment. Then the experiment planning matrix is automatically generated. Table 2 below summarizes the parallel experiment planning matrix for a full-fledged experiment.

Table 2. Full factor experiment with parallel experimentation planning matrix

*i*experience №	x_1	x_2	…	x_m	Parallel experiments				$y_{ўр\ i}$
					1	*2*	…	*n*	
1	*-1*	*-1*	…	*-1*	y_{11}	y_{12}	…	y_{1n}	$y_{ўр1}$
2	*+1*	*-1*	…	*+1*	y_{21}	y_{22}	…	y_{2n}	$y_{ўр\ 2}$
…	…	…	…	…	…	…	…	…	…
N	*+1*	*+1*	…	*+1*	$_{N1}$	y_{N2}	…	y_{Nn}	$y_{ўр\ N}$

Then we can switch to this experiment. The number of experiments carried out by the sampler, if necessary, is analyzed. The experimental experiments are calculated based on the formula (1) above. Regression models are created based on the data obtained by expedition. The coefficients of the regression equation are calculated on the basis of formula (7). In independent variables, the coefficients represent the strength of the factors. The greater the coefficient, the greater the factor. After calculating the model's coefficients, the adequacy of the models can be checked. For this purpose, the equivalence dispersion is the formula (16). The validity of regression coefficients is determined by the *t-criterion* of Student. The t-criterion value is calculated based on formula (17). The formula for the model's elasticity is used in the formula Fisher's criterion (16).

RECOMMENDATIONS

Our researches show that the characteristics and subtleties of Economic Information Systems (EIS) consumption are as follows:

- Practical capabilities- the ability to address issues that satisfy the stated needs of customers and users in the implementation of a EIS application complex under certain circumstances;
- Appropriateness - the set and description of the sub-qualifications and attributes of the EIS, which define the purpose, the nomenclature, the basic, necessary and adequate tasks of the EIS that comply with the requirements and specialties of the customer and the user;
- Accuracy - the ability of the EIS to ensure that the user has the right or desired results and the external effectiveness;
- Interaction ability - the characteristic of interaction of EISs and their components with the number of internal and external environments with one or more components;

- Protection - Capability of EIS components to protect software and information from any adverse effects;
- Reliability - provision of programs that are less likely to be rejected in the real-time EIS process;
- efficiency - the characteristics of the EIS, which provide the usefulness of the solution of practical issues, taking into account the number of calculated sources used in the conditions of the established conditions;
- ease (availability) - complexity of understanding, learning and profitability of EIS, as well as attributes of attractiveness of the consumer for use under defined conditions;
- Tracking - adaptation to EIS configuration and features change and modification;
- mobility - readiness of EIS to be transferred from one hardware-operating environment to another.

CONCLUSION

The role of the role of small business and private entrepreneurship in the economic reforms being successfully implemented in not only in well-developed stated but also you can face this tendency in Uzbekistan. Although, necessary normative and legal acts on the creation and effective functioning of small business entities have been adopted, contribution and their share in the structure of gross domestic product are not expanding dramatically. Nevertheless, paper concludes that innovation technologies play an important role in the further development and advancement competitiveness. In summary, the widespread use of the above-mentioned methodology for evaluating the quality of consumed information systems for small businesses is a key criterion for their proper management decisions on ICT use.

REFERENCES

Abdukarimov B.A. (2013). Trade economics.

Akimov, A., & Dollery, B. (2009). Financial development policies in Uzbekistan: an analysis of achievements and failures. Economic Change and Restructuring, 42(4), 293–318.

Anvardjanovich, S. A. (2017). Organizational-economic mechanisms of management of manufacturing diversification in the companies of textile industry. Journal of Management Value and Ethics, 7(1).

Hudaykulov, A., Hongyi, X., & others. (2015). The effects of social capital on team performance: A study of RD departments in Uzbekistan. International Journal of Innovation and Economic Development, 1(1), 80–91.

Mishkin, F. S. (2007). The economics of money, banking, and financial markets. Pearson education.

Perraton, H. (2004). Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan; ICT Use in Education. Meta-Survey on Effective Use of ICT.

Efimov E.N. Experimental methods for assessing the consumer quality of distributed information systems: Monograph. - Growth. Gos. Economy. Un-t RINH, Rostov-on-Don, 2001. - 224 p.

Isaev G.N. Development of a regression model for the determination of generalized indicators for assessing the quality of the functioning of information systems. // STI Ser. 2. Inform. processes and systems. 2003.

Lipaev V.V. Selection and evaluation of software quality characteristics. Methods and standards. - M .: SIPTEG, 2001. - 228 p.

Titorenko G.A. Information systems in the economy. - 2 nd ed., Pererab. and additional. G.A. Titorenko. - Moscow: UNITY-DANA, 2008. - 463 p.

Laudon K.C., Laudon J.P. Management Information Systems. Prentice Hall. Upper Saddle River, New Jersey. 2002. - 679.

Laudon K.C., Laudon J.P. Management Information Systems. Managing the digital firm fourteenth edition global edition. 2015.