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ASSESSMENT OF ATTRACTIVENESS INTERMEDIARIES IN THE FORMATION OF LOGISTIC CONNECTIONS OF THE POULTRY ENTERPRISES

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Abstract
An effective model of the logistics system for a poultry enterprise is the continuous close interaction of all components of the logistics system, established logistical links. The aim is to generalize the criteria and indicators for choosing an intermediary at the stage of forming logistic links and evaluate the effectiveness of choosing such an intermediary in cooperation with the poultry company and a consumer. Results: formed a system of criteria for selecting intermediaries at the stage of forming logistics links, which are grouped into three indicators; by express survey was assessed the weight of each indicator and with preliminary determination of the sample size and confidence interval. The verification of the representativeness of the research is through the calculation of the correlation coefficient.

Keywords: *intermediary, logistic connections, evaluation indicator, poultry enterprises.*
JEL Codes: *C13, D21, L22, Q13.*

Introduction

The model of the logistic system of an enterprise is built in such a way that there is constant dependence between all types of flows in the logistic system (material, informational, financial and service flows) in order to satisfy the requests of a customer on the one hand and to achieve maximal profit as confirmation of the effective result of the enterprise on the other hand.

Efficiency of the logistical system for the poultry enterprise is continuous close interaction between all components of the logistic system, established logistic connections and consistent impact on logistic flows. Developing poultry enterprises, considering all features of their business activity, require improving certain systems of assessing the best intermediary for the distribution of chicken meat in the process of forming logistic connections. The enterprise undergoes a certain algorithm of actions for choosing an intermediary responding the

questions which might assist in formulating more specifically the requirements and expectations from cooperation with the future intermediary. At the stage of current constant dynamic changes, the need for assessing efficient cooperation with an intermediary and grounding the selection of such an intermediary before cooperating with him/her arises considering certain criterion of his/her business activity.

The aim of the research is to generalize the criteria and indicators for choosing an intermediary at the stage of forming logistic connections and estimation of the efficacy of choosing such an intermediary in cooperation with the poultry enterprise and a consumer.

The main tasks of the research are the generalization of the set of criteria for determining the attractiveness of the intermediary and grouping them into indicators; determination of the sample size and carrying out express surveying customers on the degree of importance of indicators; formalization of the research results into the mathematical model for assessing the attractiveness of the intermediary; checking the representativeness of the research by calculating the correlation coefficient.

The object of the research in the article is criteria for determining attractiveness of intermediaries in the process of forming logistic connections at the poultry enterprise.

The methodology of the research of the present article includes carrying out expert surveying customers on issues of the importance for them of one of the three indicators of choosing an intermediary for further carrying out estimation of the efficacy of such a choice while forming logistical connections for the poultry enterprise. The following methods were used in the research: expert assessments – for studying interests of customers in choosing an intermediary; mathematical model of importance estimation – for determining the weighting coefficient of indicators for estimating the efficacy of an intermediary while forming logistical connections; correlation-regression analysis – for confirming the possibility of utilizing the proposed method of estimating efficacy of intermediaries at forming logistic connections; graphic – for visual representation of the model of estimating the efficacy of choosing the intermediary for the formation of logistic connections at the poultry enterprise; table – for generalization of the information on the selection criteria and indicators of evaluating the attractiveness of an intermediary for the distribution of the chicken meat by poultry enterprises via distribution channels.

One of the key issues of forming the efficient logistical system of a poultry enterprise is the establishment of logistic connections on produce distribution and selection of such a model of estimating the attractiveness of intermediaries, which can firstly help to select enterprises for the distribution which offer favorable cooperation conditions, and secondly – to estimate the attractiveness of the trading company with "customer's eyes", based on the formation of the optimal combination of different intermediaries, which might efficiently satisfy the needs of produce manufacturers and consumers.

Materials and Methods

It is generally known that in order to increase the level of efficiency of enterprise management as a complex logistic system, it is divided into the following levels (subsystems): subsystem of logistic supply management; subsystem of logistic production management; subsystem of logistic sales management. All subsystems of the logistic system of the enterprise are interconnected at different stages by logistic connections. At the stage of management of each subsystem, certain goals and objectives are set, which together should not contradict each other and the achievement of which will bring economic effect for the enterprise as a whole.

Balnk I.A. (1999) believes that that the purpose of the logistic system is the delivery of goods to a given place, in the right quantity, at the right time, at a given level of costs.

A special place in the logistic system belongs to the logistic connections that the company chooses. Analysis of sources

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(Kobzeva A. et. al., 2008) has shown, that today there are three types of connections in the logistics system of the enterprise (direct connections, tiered connections, flexible connections). Practice shows that most large enterprises maintain flexible connections in the logistic system of the enterprise, when the implementation is carried out both with the participation of an intermediary and without him/her. Separately, there is an opinion that today the market, regardless of the sales channel, is managed by intermediaries, and logistic connections in this case are close to echelons. Intermediaries dictate the rules that are beneficial to the manufacturer. According to the group of the authors, as: O. Bilovodska, T. Repich, T. Sorokina, V. Pylypchuk, A. Coughlan the optimal criteria for evaluating and choosing an intermediary for both the company and the consumer are: the difference in technology and capacity, competitive and demographic situation, time and reliability of delivery, accuracy of the order, availability of information, lack of damage, business process, service, profitability and creditworthiness, degree of their compliance with consumer requirements (product range, pricing, discounts), manageability, i.e. the possibility of further control over the movement of goods and prices, the prospects of channels in terms of the long-term cooperation (including sales and growth), the reputation of the intermediary, market coverage and proximity of the retail network to the consumer, qualification of the sales staff of the intermediary, sales promotion system, market coverage by retail chain stores, payment terms, participation in product promotion programs.

Experience and practice show that the expert method gives a more reliable result than the traditional methods of group decisions to determine the weight of an indicator (Martino, 1977). In practice, there are two main approaches to assessing the importance of the characteristics and objectives of forecasting. The first approach is based on a survey of experts (Dobrov, 1967), the other one is based on developing a certain mathematical model (Hmoshynskyi, 1969).

Determining the weight of indicators in an analytical way is based on determining the normalizing function, which satisfies a fairly general system of boundary conditions. In this case, the absolute and relative weight will be set as a result of determining the place occupied by a criterion in accordance with the ranked sequence. The absolute weight of the indicator will vary from one to zero, i.e. $0 \le I_j \le 1$, the relative weight will be determined in fractions of a unit (Hmoshynskyi, 1969).

The sample size can be determined in different ways considering different factors. But the representativeness of the sample does not depend on the total sample size, but on the method of sample formation. So to determine the sample size when conducting research, it is necessary to use formula (1). Statistical analysis is usually used to determine the sample size (Harkavenko, 2010):

$$n = \frac{z^2 \cdot pq}{e^2}, \quad (1)$$

where, n - sample size;

z – normalized deviation (determined depending on the confidence level of the result obtained);

p – determination of variation for sampling (difference of values of signs at different units of the given set);

q – 100- p;

e – permissible error.

A confidence interval is a range with extreme points; it corresponds to a certain percentage of certain answers to a question with a given reliability. In the marketing research, the standard is a confidence interval of 95 - 99%. Each of these values corresponds to a certain value of the normalized deviation of the estimate (t): t = 1 (for confidence probability 0.683), t = 1.96 (for confidence probability 0.95), t = 2 (for confidence probability 0.954), t =3 (for confidence probability 0.999) (Zhluktenko, 2010).

The correlation coefficient is a quantitative measure of the closeness of the

linear relationship between the variables of the model and is determined by the formula (2) (Vasylieva et. al., 2017):

$$R = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}, \quad (2)$$

That is, the purpose of the correlation theory is to determine the nature of the relationship between related elements, namely: strong, weak, absent (Vasylieva et. al., 2017).

Research results and Discussion

Achieving the efficiency of the logistics subsystem for the sale of chicken products is possible through the assessment of the effectiveness of choosing an intermediary at the stage of establishing logistics links by the poultry enterprise, which are presented as results in the relevant indicators (Fig. 1).

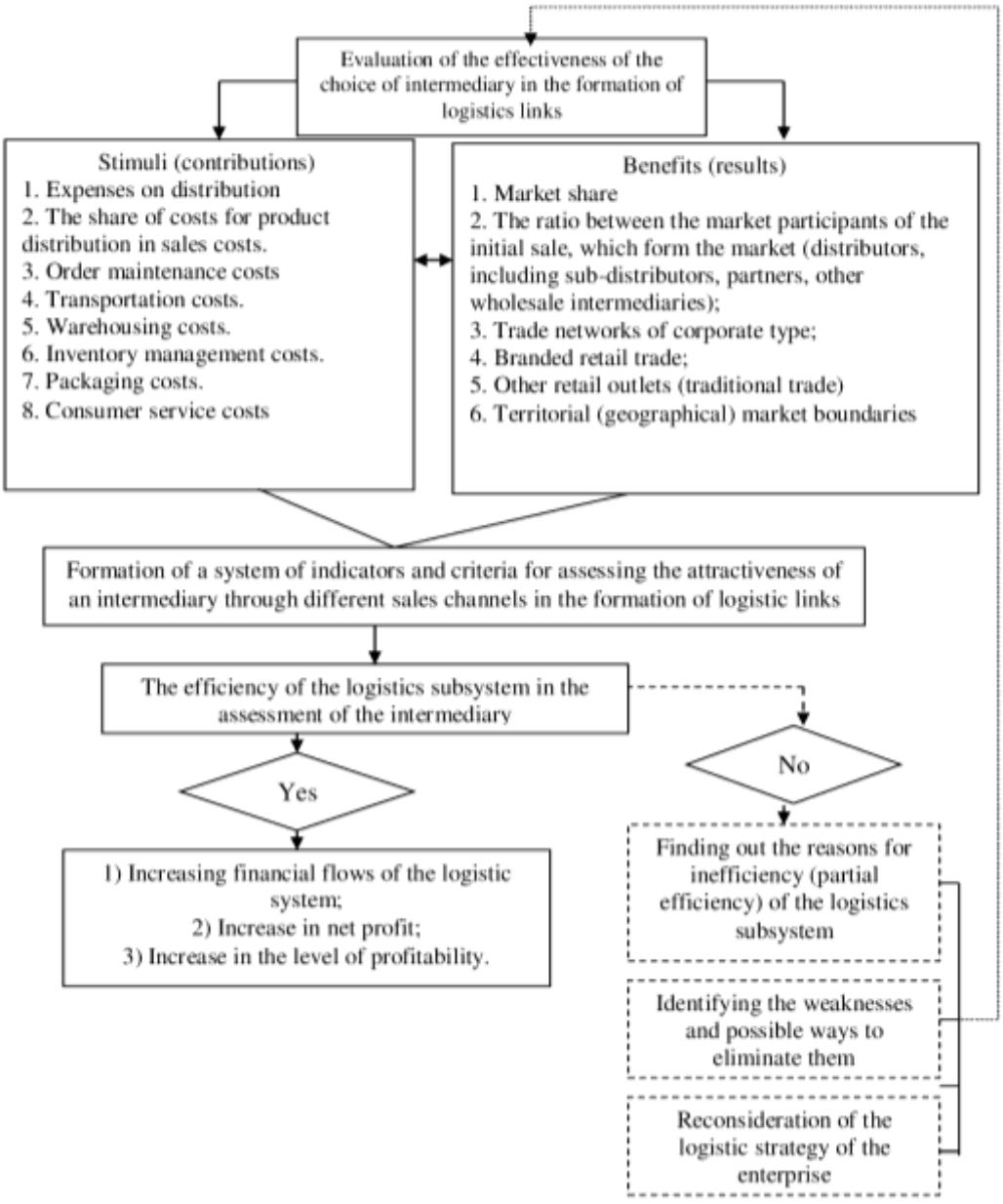

Figure 1. Model for assessing the effectiveness of choosing an intermediary in the formation of logistic links of the poultry enterprise

**Developed by the authors.*

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The formation of the logistic subsystem of an enterprise at the stage of formation of logistic links, regardless of the distribution channel, has a significant impact both directly on the efficiency of sales and the overall efficiency of the enterprise. Considering the fact that today in the market of chicken meat, almost 80% of companies work through intermediaries, choosing the type of logistic - echelon. Therefore, defining a set of criteria for selecting an intermediary and grouping them into three evaluation indicators will allow the company to reduce its own costs, in particular for logistic activities, including the distribution costs of the company, which are a part of the company's operating costs (Table 1).

Table 1. Characteristics of selection criteria and indicators for assessing the attractiveness of an intermediary in the sale of chicken meat by poultry enterprises through different distribution channels

**Developed by the authors.*

Selection criteria and evaluation indicators of the intermediary	**Channels for the sale of chicken meat, considering various logistic links**		
	Large retail chains (supermarkets)	Franchising networks (branded trade, partner retail trade)	Traditional retail chain (small retail stores)
Indicators for assessing the technical and technological attractiveness of an intermediary (I_{tta})			
Geographical coverage	Significant (usually a large number of points of sale represented in different cities)	Insignificant (usually a small number of points of sale)	Significant (a variety of small points of sale are in different areas of the city, usually well-covered "sleeping" areas)
Square of point of sale	From 300 to 3000 m^2	From 50 to 300 m^2	Up to 50 m^2
Point of sale traffic	High traffic areas	Insignificant traffic area (even with a successful location of the point of sale)	Insignificant traffic area (even with a successful location of the point of sale)
Provision of transport	Served by the transport of the enterprise - the manufacturer	Served by the transport of the enterprise - the manufacturer	Served by the transport of the enterprise - the manufacturer, but delivery by transport of the trading enterprise is possible
Work schedule	8.00-20.00/7 or 7/24	8.00-20.00/7	8.00-20.00/7 or 7/24
Indicators for assessing the economic attractiveness of an intermediary (I_{ea})			
The level of margin on suppliers' goods	The level of margin depends on supermarket positioning policy	The level of margin is set by the manufacturer	Average (depending on the location of the trading company, corresponds to the purchasing power of potential buyers)
Number of promotional offers	High	High	Almost absent
Terms of payment for the delivery of goods	Allowed up to 2 weeks of deferred payment depending on the terms of the supply contract)	Without delays	Payment upon delivery
Indicators for assessing the marketing attractiveness of an intermediary (I_{ma})			
Ability to promote new products	On the territory of the trade enterprise there is an opportunity for carrying out actions (tasting sessions, drawing of prizes)	On the territory of the trade enterprise there is an opportunity for carrying out actions (tasting sessions, drawing of prizes)	No product promotion activities are held on the territory of the trade enterprise

Quality and location of trade equipment	High, with easy access to products	High, with easy access to products	Average, the display of goods is carried out in a shop window to which the buyer does not have access
Possibility of impulsive purchase	Often the purchase is not planned and is the result of a psychological impulse	Depends on actions	Depends on actions
Atmosphere and aesthetic decoration	Average level of compliance	High level of compliance	The level of compliance is below average

The information presented in table 1 shows that it will be convenient for the poultry enterprise to generalize all criteria of their grouping into three indicators:

1. Indicator for assessing the technical and technological attractiveness of the intermediary - geographical coverage, area of the point of sale, traffic of the point of sale, work schedule;

2. Indicator for assessing the economic attractiveness of an intermediary - the level of margin on the goods of suppliers, the number of promotional offers, the terms of payment for delivery of goods.

3. Indicator for assessing the marketing attractiveness of an intermediary - t he possibility of promoting new products, quality and location of trade equipment, the possibility of "impulse" purchase, atmosphere and aesthetic decoration.

When forming logistics links for different sales channels, the criteria for evaluating the choice of intermediary will have different characteristics that must be taken into account when conducting the survey.

To substantiate the criteria and indicators for assessing the attractiveness of the intermediary in the formation of logistics links, it is necessary to calculate the weight of indicators for assessing the attractiveness of an intermediary in the sale of chicken meat by poultry companies through various sales channels. The importance of indicators for assessing the effectiveness of the choice of intermediary in the formation of logistic links of the poultry enterprise is calculated using the method of expert evaluations. The proposed method of evaluating intermediaries in the formation of logistic links can be used in the formation of logistic links for different sales channels for enterprises, regardless of ownership.

For a poultry enterprise as a producer of products, when choosing an intermediary, the main criteria are the pricing policy of the trading company (purchase prices) and the amount of products that the trading company is able to sell in a given period of time. But these criteria provide the opportunities for only tactical decisions. To build a sales strategy of cooperation with intermediaries, it is definitely necessary to understand the behavioral characteristics of consumers and the motives for buying products in a particular place.

Consumers were interviewed as to determine which of the criteria included in the indicators were important to them when purchasing chicken. The express survey was conducted according to a formalized questionnaire, which presented three indicators for assessing the attractiveness of the intermediary in the sale of chicken meat through different sales channels with a full description of the criteria included in each indicator. Since the results of the express survey must be quantified, the questionnaire usually does not provide open-ended questions.

The sample size for the survey is 569 respondents. The calculation of the sample size for conducting an express survey of consumers to determine the importance of indicators for assessing the attractiveness of an intermediary in the formation of logistic links was carried out taking into account the following data and formula (1): z – the normalized deviation for our study, it will be 2 for the confidence probability 95.4%, the number of people who will consume chicken in the region (p) will be 65%, q = 35%, permissible error (e) will be 4%.

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$$n = \frac{2^2 \cdot 65 \cdot 35}{4^2} = 568.75 \approx 569 \text{ respondents}$$

An interval scale is used to formalize the estimates obtained from the experts. The use of an interval scale makes possible to transform the estimate (Beshelev, 1980). Therefore, experts are asked to divide the indicators of assessing the attractiveness of an intermediary by the level of importance and impact of a particular indicator on the purchase of chicken through different sales channels. The rating scale (r) in the express survey is as follows:

1 point - the indicator is not important or has little impact on consumer decisions ("low level");

2 points - the indicator is at the average level, it is important and it influences the consumer's decision ("middle level");

3 points - the indicator is important and it influences the consumer's decision ("high level").

The results of express consumer surveys on the importance of indicators (indicator of technical and technological attractiveness of an intermediary, indicator of economic attractiveness of an intermediary, indicator of assessment of marketing attractiveness of an intermediary) evaluation of the effectiveness of cooperation is represented in Table 2.

Table 2. The results of consumer surveys and the level of importance of indicators of evaluation of an intermediary in the formation of logistic links of the poultry enterprise

**Developed by the authors*

Indicators for assessing the attractiveness of an intermediary (I_{aai})	**Level "high level" (r_3=3)**		**Level "middle level" (r_2=2)**		**Level "low level" (r_1=1)**		**The total amount of expert evaluation points**	**Number of experts interviewed**	**Average score of answers**	**The weight of the indicator of assessing the attractiveness of an intermediary**
	number of consumers	sum of scores	number of consumers	sum of scores	number of consumers	sum of scores				
I_j	Ne_3	$I_j(Ss_3)$	Ne_2	$I_j(Ss_2)$	Ne_1	$I_j(Ss_1)$	$\sum_{i=1} I_j(Ss_i)$	$\sum_{i=1} I_j(Ne)$	$\overline{Ss}_{I_j}$	vI_j
Indicators for assessing the technical and technological attractiveness an intermediary *(I_{tta})*	56	168	76	152	53	53	373	185	2.016	0.318
Indicators for assessing the economic attractiveness of an intermediary *(I_{ea})*	81	243	69	138	41	41	422	191	2.209	0.348
Indicators for assessing the marketing attractiveness of an intermediary *(I_{ma})*	68	204	80	160	45	45	409	193	2.119	0.334
Total score							**1204**	**569**	**6.345**	**1.0**

A number of formulas have been developed to determine the importance of intermediary assessment indicators in the formation of logistic links. The number of points for each indicator for a particular level ($I_j(Ss_i)$) is determined according to the formula (3):

$$I_j(Ss_i) = Ne_i \cdot r_i, \quad (3)$$

Where, Ne_i – the number of experts (consumers) who preferred *j*-indicator by *i*-level;

r_i – scale of assessing *i*-level.

Correspondingly $\sum_{i=1} I_j(Ss_i)$ we determine according to the formula (4):

$$\sum_{i=1} I_j(Ss_i) = I_j(Ss_1) + I_j(Ss_2) + I_j(Ss_3).....I_j(Ss_i), \quad (4)$$

where, $I_j(Ss_1) + I_j(Ss_2) + I_j(Ss_3).....I_j(Ss_i)$ - the sum of the evaluation points for the *j* indicator of the evaluation of the attractiveness of an intermediary for the *i* level according to the scale according of formation of evaluations (*r*);

$\sum_{i=1} I_j(Ss_i)$ - the total sum of points of assessment of experts on the *i* indicator taking into account all levels of a scale r_i.

To determine the level of weight of each individual Indicator of the assessment of the attractiveness of an intermediary (*Ij*) it is necessary to determine the total number of interviewed experts ($\sum_{i=1} I_j(Ne_i)$) and the average score of the experts' answers ($\overline{Ss}_{I_j}$) according to the formulas (5) and (6):

$$\sum_{i=1} I_j(Ne_i) = Ne_1 + Ne_2 + Ne_3....Ne_i, \quad (5)$$

where, $\sum_{i=1} I_j(Ne_i)$ – the total number of experts who preferred the *j*-indicator of assessing the attractiveness of an intermediary in the formation of logistic links;

$Ne_1, Ne_2, Ne_3....Ne_i$ - the number of experts who preferred the *j*-indicator according to the level of the rating scale

$$\overline{Ss}_{I_j} = \frac{\sum_{i=1} I_j(Ss_i)}{\sum_{i=1} I_j(Ne_i)}, \quad (6)$$

where, $\overline{Ss}_{I_j}$ - the average score of the answers of experts on the *j*-indicator of assessing the attractiveness of an intermediary in the formation of logistic links.

The weight of a single indicator to assess the attractiveness of the intermediary in the formation of logistics links (vI_j) will be determined as follows (7):

$$vI_j = \frac{\overline{Ss}_{I_j}}{\sum \overline{Ss}_{I_i}}, \quad (7)$$

Accordingly, the average total score of the three indicators for assessing the attractiveness of an intermediary ($\sum_{i=1} \overline{Ss}_{I_j}$) must be determined by the formula (8):

$$\sum_{i=1} \overline{Ss}_{I_j} = \overline{Ss}_{I_{tta}} + \overline{Ss}_{I_{ea}} + \overline{Ss}_{I_{ma}}, \quad (8)$$

Calculation of indicators ($I_j(Ss_i)$), ($\sum_{i=1} I_j(Ne_i)$), ($\overline{Ss}_{I_j}$) and (vI_j) according to formulas (3), (4), (5), (6) and data of table 2 for each separate *j*-indicator of an estimation of attractiveness of an intermediary at formation of logistic communications will be:

1) Indicators for assessing the technical and technological attractiveness of an intermediary (*Ittta):*

$I_{tta}(Ss_3) = 51 \cdot 3 = 168$ $I_{tta}(Ss_2) = 76 \cdot 2 = 152$ $I_{tta}(Ss_1) = 53 \cdot 1 = 53$

$$\sum_{i=1} I_{tta}(Ss) = 53 + 152 + 168 = 373$$

$$\sum_{i=1} I_{tta}(Ne) = 51 + 76 + 53 = 185$$

$$I_{tta}(\overline{Ss}) = \frac{373}{185} = 2.016$$

2) Indicators for assessing the economic attractiveness of an intermediary *(Iea):*

$I_{ea}(Ss_3) = 81 \cdot 3 = 243$ $I_{ea}(Ss_2) = 69 \cdot 2 = 138$ $I_{ea}(Ss_1) = 41 \cdot 1 = 41$

$$\sum_{i=1} I_{ea}(Ss) = 41 + 138 + 243 = 422$$

$$\sum_{i=1} I_{ea}(Ne) = 41 + 69 + 81 = 191$$

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$$I_{ea}(\overline{Ss}) = \frac{422}{191} = 2.209$$

3) Indicators for assessing the marketing attractiveness of an intermediary *(I_{ma}):*

$I_{ma}(Ss_3) = 68 \cdot 3 = 204 \quad I_{ma}(Ss_2) = 80 \cdot 2 = 160 \quad I_{ma}(Ss_1) = 45 \cdot 1 = 45$

$$\sum_{i=1} I_{ma}(Ss) = 45 + 160 + 204 = 409$$

$$\sum_{i=1} I_{ma}(Ne) = 45 + 21 + 68 = 193$$

$$I_{ea}(\overline{Ss}) = \frac{409}{193} = 2.119$$

Accordingly, the indicator $\sum_{i=1} \overline{Ss_{I_j}} = 6.345$, is determined using the following formula (8):

$$\sum_{i=1} \overline{Ss_{I_j}} = 2.016 + 2.209 + 2.119 = 6.345$$

The determination of the weight of individual indicators for assessing the attractiveness of the intermediary in the formation of logistic links is as follows, with $vI_j = 1$ (Fig. 2):

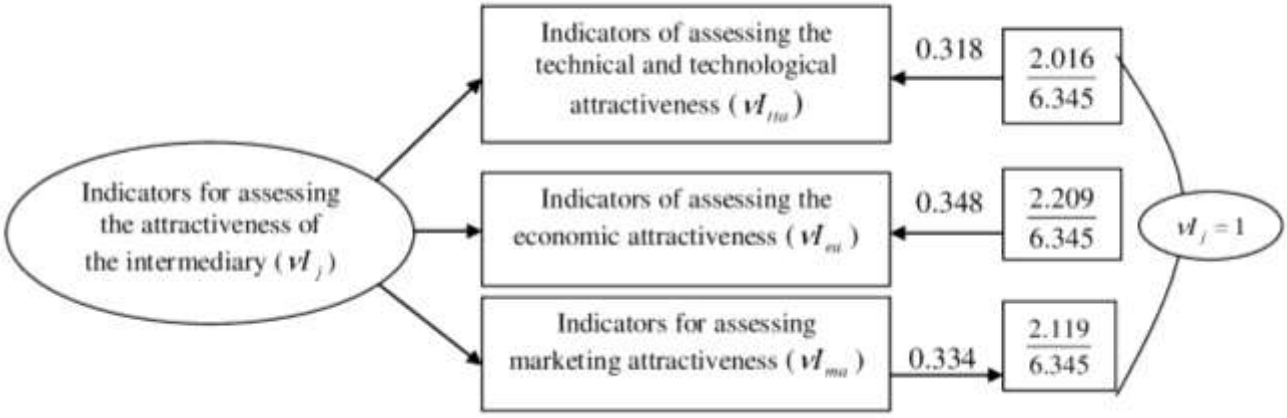

Figure 2. Determination of the importance of indicators of evaluation of the intermediary in the formation of logistic links of the poultry enterprise

**Developed by the authors*

Analysis of the data presented above (Table 2 and Fig. 2) on the results of consumer surveys on the choice of indicator for assessing the effectiveness of cooperation with an intermediary in the purchase of chicken meat showed that the most important indicator for consumers is the indicator of economic efficiency of the sales channel (level of margin, number of promotional offers, terms of payment for the goods) - 422 points with a weight index of 0.348. The indicator of assessing the marketing attractiveness of the sales channel (the possibility of promoting a new product, the quality of retail equipment, the possibility of impulse buying, atmosphere and aesthetic design) in terms of importance was second with 409 points and 0.334. Accordingly, the indicator of technical and technological assessment of the attractiveness of the sales channel (geographical coverage, square of a point of sale, traffic at a point of sale, transport, and work schedule) is less important for consumers than the previous two with a total of 373 points and a corresponding weight level of 0.318.

As a result, the model for calculating the indicator for assessing the effectiveness of the choice of an intermediary at the stage of establishing logistic links of the poultry enterprise will be as follows:

$$I_{aai} = 0.318 \cdot I_{tta} + 0.348 \cdot I_{ea} + 0.334 \cdot I_{ma}$$

The existing connection between the values of the indicators can be checked by determining the correlation coefficient by formula (2). For the calculated values of indicators vI_j and $\overline{Ss}_{I_j}$ the correlation

coefficient is R=0.9999. The value of the calculated correlation coefficient indicates a direct strong correlation between the studied values vI_j and $\overline{Ss}_{I_j}$ for each indicator of the assessment of the choice of an intermediary at the stage of establishing logistic links by the poultry enterprise. This value of the coefficient indicates the possibility of using this methodological approach to assess the attractiveness of the choice of an intermediary in establishing logistic links of the poultry enterprise.

Conclusions

The formation of an efficient logistics system begins at the stage of building logistics links. To improve the functional efficiency of the logistics subsystem of the poultry enterprise, the criteria and indicators of the choice of intermediary in the sale of chicken meat by poultry enterprises through different sales channels at the stage of formation of logistics links are summarized.

First, a system of indicators was formed, which summarized the comparison of different criteria for selecting intermediaries to identify shortcomings and advantages in working with them. The defined criteria for selecting intermediaries are grouped into three groups of indicators: Indicators for assessing the technical and technological attractiveness of the intermediary (Itta), Indicators for assessing the economic attractiveness of the intermediary (Iea), Indicators for assessing the marketing attractiveness of the intermediary (Ima).

Second, formed a mathematical model for assessing the attractiveness of intermediaries, the weight of indicators was determined by conducting an express survey of consumers on their degree of importance (for the transformation of the assessment, a scale of intervals was used). For the express survey, the sample size was first calculated and confidence interval.

Thirdly, consumer surveys on the choice of indicator to assess the effectiveness of cooperation with the intermediary show that when purchasing chicken meat, the most important indicator for consumers is the indicator of economic efficiency of the distribution channel, which means that when choosing an intermediary, the company should first choose a trading company which a consumer associates with the ability to save money.

The verification of the representativeness of the research through the calculation of the correlation coefficient confirmed the objectivity of the consumer survey on the distribution of weight in the mathematical model of assessing the attractiveness of intermediaries in the sale of poultry products.

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