

Електронний журнал «Ефективна економіка» включено до переліку наукових фахових видань України з питань економіки (Категорія «Б», Наказ Міністерства освіти і науки України № 975 від 11.07.2019). Спеціальності – 051, 071, 072, 073, 075, 076, 292. Ефективна економіка. 2024. № 11.

DOI: <http://doi.org/10.32702/2307-2105.2024.11.67>

УДК 338.46

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METHODS AND APPROACHES FOR IDENTIFYING THE DEVELOPMENT PARADIGM OF ENTREPRENEURSHIP AND LOGISTICS NETWORKS IN THE TOURISM AND HOSPITALITY SECTOR

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**МЕТОДИ ТА ПРИЙОМИ ІДЕНТИФІКАЦІЇ ПАРАДИГМИ РОЗВИТКУ
ПІДПРИЄМНИЦТВА ТА ЛОГІСТИЧНИХ МЕРЕЖ СФЕРИ ТУРИЗМУ
ТА ГОСТИННОСТІ**

The modern development of entrepreneurship in the tourism and hospitality sector largely depends on the effective management of the business model itself and the logistical networks that facilitate connections between the entrepreneur and various links in the supply chain of products and services. In globalization and rapid technological advancement, business models and their associated logistical networks facilitate access to production resources and become crucial determinants of business competitiveness. Moreover, contemporary challenges, such as stricter environmental regulations, shifting consumer preferences, the rise of digital technologies, and market unpredictability, drive the need to adapt existing management models, catalyzing the development of new paradigms in this field. Therefore, this article aims to explore methods and techniques that facilitate the identification of a development paradigm for entrepreneurship and logistical networks in the tourism and hospitality sector. The research identifies that the development paradigm for entrepreneurship and logistical networks in the tourism and hospitality sector is shaped by various factors that demand flexibility and adaptability from businesses in the face of change. Flexible methods enable businesses to respond quickly to new challenges, such as changes in consumer preferences, technological innovations, sustainability requirements, competition, and globalization, and timely identify new opportunities and adjust strategies. It has been proven that the identification of the development paradigm for entrepreneurship and logistical networks in the tourism and hospitality sector involves multiple correlation-regression analyses, which is one of the key methods for studying the interrelationships between various factors influencing the development of entrepreneurship and its associated logistical networks. It is proven that the main goal of identifying the paradigm is to apply an approach focused on building a model with various factors to assess the individual and combined impact on the effectiveness and functionality of entrepreneurship and logistics, which allows for the use of multiple regression equations to evaluate and forecast their changes in the field of tourism and hospitality.

Сучасний розвиток підприємництва у сфері туризму та гостинності значною мірою залежить від ефективного управління не лише самою моделлю підприємництва, але й логістичними мережами, що забезпечують зв'язок між підприємцем та різними ланками постачання продуктів і послуг. В умовах глобалізації та стрімкого розвитку технологій моделі підприємництва та логістичні мережі, що їм належать, не лише полегшують доступ до виробничих ресурсів, але й стають визначальними для конкурентоспроможності бізнесу. Крім того, сучасні виклики, такі як посилення екологічних вимог, зміна споживчих вподобань, розвиток цифрових технологій та непередбачуваність ринкових умов, стимулюють адаптацію чинних моделей управління, що є поштовхом до формування нових парадигм у цій сфері. Відтак, метою статті є дослідження методів та прийомів, що сприяють визначенню парадигми розвитку підприємництва та логістичних мереж у сфері туризму та гостинності. У межах дослідження визначено, що парадигма розвитку підприємництва та логістичних мереж у сфері туризму та гостинності формується під впливом різноманітних факторів, які вимагають від підприємств гнучкості та адаптивності в умовах змін. Гнучкість методів дозволяє підприємствам оперативно реагувати на нові виклики, такі як зміни в уподобаннях споживачів, технологічні інновації, вимоги сталого розвитку, конкуренцію та глобалізацію, а також вчасно виявляти нові можливості і коригувати стратегії. Доведено, що під час визначення парадигми розвитку підприємництва та логістичних мереж туризму та гостинності йдеться про множинний кореляційно-регресійний аналіз, який є одним із ключових методів для дослідження взаємозв'язків між різними факторами, що впливають на розвиток як підприємництва, так і належних до нього логістичних мереж. Доведено, що основною метою ідентифікації парадигми є застосування підходу, спрямованого на побудову моделі з різними факторами для оцінки окремого та сукупного впливу на ефективність і функціональність підприємництва та логістики, що дає змогу

використовувати рівняння множинної регресії для оцінки та прогнозування їх змін у сфері туризму та гостинності.

Keywords: *paradigm; correlation-regression analysis; development; changes in consumer preferences; variables; traditional econometric tools.*

Ключові слова: *парадигма; кореляційно-регресійний аналіз; розвиток; зміна споживчих вподобань; змінні; традиційні економетричні інструменти.*

Problem statement. The modern development of entrepreneurship in the tourism and hospitality sector largely depends on the effective management of the business model and the logistical networks that connect the entrepreneur with various links in the supply chain of products and services. In globalization and rapid technological development, business models and their associated logistical networks facilitate access to production resources and become crucial determinants of business competitiveness. Moreover, contemporary challenges, such as stricter environmental regulations, changing consumer preferences, the development of digital technologies, and market unpredictability, stimulate the need to adapt existing management models, acting as a trigger for the formation of new paradigms in this field.

The analysis of recent researches and publications. The issue of the essence and formation of the paradigm for the development of entrepreneurship and logistical networks in the tourism and hospitality sector has been explored to varying degrees by many scholars, including Holovnia O.M., Stavskaya Y.V., Maslihan O.O., Korolovych O.O., Zaiachkovska H., Tserklevych V., Vovk S., and others. Indeed, Holovnia O.M. and Stavskaya Y.V., in their research on this topic, noted that the identification of development paradigms for entrepreneurship in the tourism and hospitality sector and their integration with logistical strategies is a complex and multifaceted task that requires a comprehensive approach. Maslihan O.O. and Korolovych O.O., in their works, analyzed the definitions of the

paradigm of entrepreneurship development and emphasized the importance of developing and applying methods that allow for the identification of key development factors and their impact on the effectiveness of logistical networks. These researchers also emphasized that contemporary analysis in this area encompasses traditional econometric tools and modern approaches, including big data analysis, modeling, and forecasting. Thus, a systematic review of econometric methods and techniques for identifying the development paradigm of entrepreneurship and logistical networks in the tourism and hospitality sector is of paramount importance.

Purpose of the article. Thus, the article aims to investigate methods and techniques that aid in identifying the development paradigm for entrepreneurship and logistical networks in the tourism and hospitality sector.

The paper main body with full reasoning of academic results. In the scientific context, the term "paradigm" gained popularity through the works of T. Kuhn. He used this concept to denote the generally accepted set of ideas and methods on which a scientific discipline is based at a certain historical period. According to Kuhn, a paradigm shift signifies a scientific revolution, where the old knowledge system is replaced by a new one due to the accumulation of knowledge that the former system can no longer explain. Unpacking the context of the paradigm, as currently presented in the existing scientific literature in a broader sense, it is noted that it represents a system of fundamental ideas, concepts, or models (if they can be constructed) that define the approaches to understanding the characteristics of the development of a specific area of economic activity [2; 6]. The formation of its content can become a kind of "framework" worldview or model of thinking that determines how facts should be interpreted, theories should be constructed, and problems should be solved within a specific area of economic activity [2].

The content of the outlined statements allows us to define the paradigm of entrepreneurship development and its associated logistical networks in the tourism and hospitality sector as a set of established conceptual approaches or their model

interpretations, which guide the main principles and directions of activity aimed at the systematic formation of profit and the organization of logistical processes in this industry. It includes fundamental principles that influence the formation of competitive advantages, the selection of effective resource management strategies, interaction with stakeholders, and adaptation to rapidly changing market conditions [4].

Such a paradigm includes the importance of integrating logistics as a core element in tourism and hospitality development. It should be noted that this involves ensuring the efficient movement of goods, services, and information, which are necessary for creating a high-quality customer experience. In this context, the focus also shifts to the implementation of digital technologies and sustainable development, as well as taking into account new consumer trends such as eco-friendliness, service personalization, speed, and convenience [2; 6].

The paradigm of entrepreneurship and logistics development in tourism and hospitality is shaped by various economic, social, and technological variables that stimulate the continuous transformation of management approaches and innovative practices in this sector. Overall, the entrepreneurship and logistics development paradigm in tourism and hospitality is shaped by various economic, social, and technological variables that stimulate the continuous transformation of management approaches and innovative practices in this sector.

The relevance of flexible methods is driven by the need for quick responses to new challenges (such as changes in consumer preferences, technological innovations, sustainability requirements, increased competition, and globalization [4-6]). Flexible approaches enable businesses to promptly identify and capitalize on new opportunities, as well as adjust strategies in response to changing market conditions. In this context, multiple correlation regression analysis plays a crucial role. It is one of the key tools for studying the relationships between various factors that influence the development of entrepreneurship and logistical networks [1; 3].

The primary objective is to build a model that incorporates a wide range of factors to assess the individual impact of each factor and their combined effects on

the performance of entrepreneurship and logistical networks within the tourism and hospitality sectors being analyzed. This model uses, the following indicators can be derived:

1. Multiple regression equations for assessing the development of entrepreneurship and logistical networks in the tourism and hospitality sector allow for determining the relationship between efficiency and the selected factors.

2. The matrix of pairwise correlation coefficients between the factors and the average correlation value, which helps to identify the degree of interdependence between the variables and assess how much they influence each other;

3. Elasticity coefficients for linear regression, which show how the outcome indicator (business and logistical network performance) changes with a change in each factor, allowing for the identification of the most influential factors;

4. Multiple coefficient of determination— an assessment of the model's accuracy, which indicates what portion of the variation in the dependent variable is explained by the selected independent variables.

5. Confidence intervals for individual and mean values of the dependent variable provide additional information about the reliability of the development model and allow for predicting potential fluctuations in performance indicators.

Thanks to these indicators, businesses in the tourism and hospitality sector can create flexible and effective models for entrepreneurship and logistical network development adapted to specific market conditions. To ensure these models are reliable and accurate, they must meet several important requirements:

1. Quantitative measurability of factors. All factors in the model must be quantitatively measurable to ensure the accuracy of analysis and comparisons. If there is a need to include a qualitative factor, it must be given a quantitative interpretation — for example, through rating scales or indices [3]. This allows for the inclusion of important aspects, such as customer satisfaction or brand reputation, which would otherwise be difficult to quantify.

2. Significant correlation with the outcome variable. Each factor must be closely related to the dependent variable. This means that the pairwise correlation

coefficient between the factor and the outcome must be statistically significant. This requirement ensures that only relevant variables, that genuinely impact the outcome, are included in the model, while secondary factors that do not have a significant effect are excluded.

3. Minimization of intercorrelation between factors. The model should avoid a strong correlation between the factors. If the independent variables are excessively correlated with one another, it complicates understanding their individual impact on the outcome leading to distorted estimates. The model becomes more reliable when it considers only those factors that contribute to the outcome without being in a strict functional relationship with each other [2].

4. Consideration of multicollinearity. Multicollinearity refers to a strong linear relationship between several factors, which can cause instability in the coefficients of the regression model and reduce the accuracy of predictions. To avoid the negative effects of multicollinearity, methods for controlling, it can be applied, such as excluding one of the interrelated factors or using statistical methods for adjustment.

Compliance with these characteristics allows for the creation of a reliable model (in the form of an equation), which will be useful for forecasting and planning. It will also help businesses in the tourism and hospitality sector optimize logistical processes, enhance the effectiveness of management decisions, and strengthen competitive positions in a dynamic market environment. The multiple regression equation can be represented as:

$$Y = f(\beta, X) + \varepsilon, \quad (1);$$

where: $X = X(X_1, X_2, \dots, X_m)$ – vector of independent (explanatory) variables; β – vector of parameters (to be determined); ε – random error (deviation); Y – dependent (explained) variable.

So, the theoretical linear equation of multiple regression has the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m + \varepsilon, \quad (2);$$

де: β_0 – the intercept, which determines the value of Y when all explanatory variables X_j are equal.

Note that the process of finding the model for the development of entrepreneurship and the related logistics networks in the tourism and hospitality sector, including the estimation of regression coefficients, should be preceded by the verification of several assumptions of OLS (Ordinary Least Squares), among which are:

1. The mathematical expectation of the random error $(\epsilon_i) = 0$ for all observations ($M(\epsilon_i) = 0$).
2. The mathematical expectation of the random error $(\epsilon_i) = 0$ for all observations ($M(\epsilon_i) = 0$)
3. Absence of autocorrelation.
4. The random error must be independent of the explanatory variables (which is expressed by the equation $E(\epsilon_i|X_i)=0$)
5. The model is linear concerning the parameters that form it.
6. Absence of multicollinearity among the explanatory variables (which is formed by a strict (strong) linear dependence, as it can artificially inflate the estimates of the regression coefficients).
7. The errors ϵ_i follow a normal distribution.

Meeting this and other (as outlined above) assumptions is important for testing statistical hypotheses and constructing confidence intervals. If the hypothesis is accepted (i.e., satisfies all the specified conditions), an empirical multiple regression equation is formed, which describes the paradigm of entrepreneurship development and logistics networks in the tourism and hospitality sector. This equation is represented in the form:

$$Y = b_0 + b_1X_1 + b_1X_1 + \dots + b_mX_m + e, \quad (3);$$

where: b_0, b_1, \dots, b_m – estimates of the theoretical values $\beta_0, \beta_1, \beta_2, \dots, \beta_m$ regression coefficients (empirical regression coefficients); e – estimate of the deviation ϵ .

Upon meeting the OLS assumptions regarding the errors ϵ_i , the estimates b_0, b_1, \dots, b_m of the parameters $\beta_0, \beta_1, \beta_2, \dots, \beta_m$ in multiple linear regression are unbiased, efficient, and consistent (i.e., BLUE estimates).

For example, to construct a multiple correlation-regression model for identifying the overall development of entrepreneurship and logistics networks in the tourism and hospitality sector in the city of Mukachevo, using the method of least squares (OLS), an equation can be formulated that reflects the relationship between the dependent variable and the independent variables. In this case, the dependent variable is the average profit of entrepreneurs operating in this sector, and the independent variables (x) are the average investments, expenses on logistics development, and human capital.

Thus, the content of the variables in the equation can be described as follows: Dependent variable (Y): the average profit of entrepreneurs operating in the tourism and hospitality sector. This indicator reflects the effectiveness of entrepreneurship in this industry, defined as the average annual profit of entrepreneurs.

Independent variables:

X_1 — the average amount of investment attracted by entrepreneurs in the tourism and hospitality sector. This variable affects the development of infrastructure and logistics networks;

X_2 — the average expenditure on logistics development per entrepreneur. Logistics costs include transportation, warehousing services, inventory management, which are core for the effective functioning of the tourism industry;

X_3 — the average expenditure on human capital development, which includes staff training, skills enhancement, customer service training, and management skills, all of which are important for improving the quality of services in the hospitality sector.

The generalization of statistical data regarding the specified variables allowed the determination of the vector of regression coefficients. According to the method of least squares, the vector s is derived from the expression: $s = (X^T X)^{-1} X^T Y$ (see Fig. 1). In particular, a column of ones is added to the matrix with the values of the variables X_j , and the matrix Y and the transposed matrix X^T are formed. Next, the matrices $(X^T X)$ and $(X^T Y)$ are multiplied.

matrices x				matrices Y				matrices X ^T				matrices (X ^T X)*				matrices (X ^T *Y)			
1	5	7	8	29	1	1	1	1	4	31.8	28	29.2	117						
1	9	5	7	30	5	9	8	9.8	31.8	266	227.8	233.16	936.6						
1	8	5	5	26	7	5	5	11	28	227.8	220	217.	835						
1	9.8	11	9.2	32	8	7	5	9.2	29.2	233.1	217.2	222	866.4						

Figure 1. Data for determining the vectors of estimates for the entrepreneurship development and logistics networks in the Mukachevo tourism and hospitality sector equation (OLS using), 2010-2023, million UAH.

Note / * In the matrix (X^TX), the number 4, located at the intersection of the 1st row and 1st column, is obtained as the sum of the products of the elements of the 1st row of the matrix X^T and the 1st column of the matrix X

Source: compiled by the author based on data from the State Statistics Service of the Zakarpattia region

Using the obtained data, we find the inverse matrix (X^TX)⁻¹, from which we determine the vector of regression coefficient estimates for the entrepreneurship and logistics networks development in the Mukachevo tourism and hospitality sector (see Fig. 2).

Y(X)=	14,145	-0,8031	0,8823	-1,8749	=	117	15,125
	-0,8031	0,0913	-0,052	0,0603		936,6	0,5
	0,8823	-0,052	0,1785	-0,2354		835	-0,375
	-1,8749	0,0603	-0,2354	0,4168		866,4	1,75

Figure 2. Vectors of regression coefficient estimates for the development of entrepreneurship and logistics networks in the tourism and hospitality sector of Mukachevo, 2010-2023, million UAH.

Source: compiled by the author based on the data from Fig. 1

Thus, the form of the regression equation (based on the regression coefficient estimates) will be:

$$Y = 15.125 + 0.5X_1 - 0.375X_2 + 1.75X_3.$$

This model is significant because it has passed the test for compliance with a number of OLS assumptions, which we outlined above.

Note that the practical significance of the outlined equation lies in the fact that it essentially identifies the paradigms of entrepreneurship and logistics network development in the tourism and hospitality sector through the interpretation of the regression coefficients.

At the same time, the constant estimates the aggregated impact of other factors (apart from those included in the model x_i) on the outcome Y , and it means that Y (the average profit of entrepreneurs) would be 15.125 million UAH in the absence of the influence of the factors we have defined as x_i . This represents the baseline profit level entrepreneurs can expect without sector investments or costs associated with developing logistics and human capital.

The coefficient b_1 shows that with an increase in x_1 (the average amount of investment attracted by one entrepreneur in the tourism and hospitality sector) by 1 UAH, Y (or the average profit of entrepreneurs) increases by 0.5 UAH. It indicates a positive impact of investments on profitability, meaning that each additional invested resource contributes to business growth and the improvement of financial results.

The coefficient b_2 shows that with an increase in x_2 (the average expenditure on logistics development per entrepreneur) by 1 UAH, Y decreases by 0.375 UAH. This coefficient may indicate that logistics expenses have a certain negative impact on profit, likely due to high operational costs that do not always lead to an immediate increase in efficiency. In particular, this may be related to the fact that high logistics costs do not always lead to rapid income growth, and in the short term, such expenses may even have a negative effect.

The coefficient b_3 shows that with an increase in x_3 (the average expenditure on human capital development) by 1 UAH, Y (or the average profit of entrepreneurs) increases by 1.75 UAH. Expenditures on staff development in the tourism and hospitality sector can have a very large positive impact, as improving employee qualifications contributes to better service quality, which, in turn, enhances the entrepreneur's reputation and attracts more customers, reflected in an increase in profit.

Conclusions from this study and prospects for further exploration in this direction. Within the framework of the study, it has been determined that the paradigm of entrepreneurship and logistics network development in the tourism and hospitality sector is shaped by various factors, which require businesses to be flexible and adaptable in changing conditions. The following conclusions were made:

1. Flexible methods allow businesses to respond quickly to new challenges, such as changes in consumer preferences, technological innovations, sustainability requirements, competition, and globalization, as well as to timely identify new opportunities and adjust strategies.

2. It has been proven that when identifying the paradigm of entrepreneurship and logistics network development in the tourism and hospitality sector, the focus is on multiple correlation-regression analysis, which is one of the key methods for studying the relationships between various factors that influence the development of entrepreneurship and its related logistics networks.

3. It has been proven that the main goal of identifying the paradigm is an approach aimed at building a model with multiple factors to assess the individual and combined impact on the efficiency and functionality of logistics. It allows the use of multiple regression equations for evaluating and forecasting changes in entrepreneurship and logistics networks in the tourism and hospitality sectors.

The prospects for further research lie in a more in-depth analysis of additional qualitative factors that influence the dynamics of entrepreneurship and logistics development in tourism and hospitality, as well as the development of models for integration into the adaptive strategic planning process.

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Стаття надійшла до редакції 07.11.2024 р.