UDC 004:640.43
DOI: 10.15587/2312-8372.2019.187755

Azarova A.,
Shiyan A.,
Mironova Y.,
Shturma L.

THE DEVELOPMENT OF SECURED CONSOLIDATED INFORMATION RESOURCE OF ACTIVITY ANALYSIS OF THE POULTRY INDUSTRY IN UKRAINE

Об'єктом дослідження є процес консолідації бізнес-інформації. У роботі розглянуто створення та використання потужної складової системи бізнес-аналітики – консолідованого інформаційного ресурсу, який уможливлює покращення розуміння бізнес-процесу, аналіз діяльності та удосконалює процес прийняття управлінських рішень на ринку птахівництва України.

Обґрунтовано методи та засоби, які використано у процесі побудови інформаційного ресурсу. Зокрема, у ході дослідження використовувалися методи аналізу та порівняння для вибору системи управління базами даних, моделі сховища даних та мови програмування. Також у процесі дослідження використовувалися метод синтезу для обґрунтування вимог до предмету дослідження та метод моделювання для створення ER-моделі. А також методи індукції та дедукції – для формування висновків та метод експертного оцінювання – для визначення економічної доцільності розроблення консолідованого інформаційного ресурсу.

Сформовано дерево цілей для створення консолідованого інформаційного ресурсу. Розроблено діаграму «сутність – зв'язок». А для систематизації отриманої інформації і детального її аналізу було спроектовано відповідну базу даних. Цей процес було реалізовано засобами СУБД (система управління базами даних) MS SQL та JavaScript. Вона використовується як засіб накопичення даних і інструмент аналізу діяльності як окремого виробника на ринку птахівництва, так і усієї галузі птахівництва разом. На основі отриманих результатів проведеного дослідження можна довести економічну та функціональну доцільність впровадження та використання консолідованого інформаційного ресурсу. Оскільки запропонована розробка значно підвищує рівень поінформованості керівництва щодо показників діяльності як окремих підприємств, так і галузі в цілому, для прийняття якісних та обґрунтованих управлінських рішень.

Упровадження та використання захищеного консолідованого інформаційного ресурсу суттєво зменшує час на отримання та оброблення потрібної інформації і робить цей процес безпечним. Крім того, даний консолідований інформаційний ресурс має високий рівень комерційного потенціалу та можливості для подальшого удосконалення з урахуванням впливу швидкозмінних зовнішнього та внутрішнього середовищ його функціонування.

Ключові слова: *захищений консолідований інформаційний ресурс, модель сховища даних, ER-модель, база даних, ринок птахівництва України.*

Received date: 10.09.2019
Accepted date: 03.10.2019
Published date: 30.12.2019

1. Introduction

In recent years, the trend of the transition of the agricultural sector from small and medium to large high-performance industrial enterprises is growing more and more. This is accompanied by a complication of interconnected complexes of technological, economic, biological and social factors. In the context of globalization of markets, the producer of agricultural products must operate highly profitable, and this is possible only if competitive products are produced. This causes the need to increase the level of automation of the main processes, control and accounting of all production parameters, creating the conditions for making the right strategic decisions by the administration of an agricultural enterprise [1]. At the same time, the current level of capabilities of computer technology allows to implement powerful automated systems that can be used at all levels of the life cycle of the economy [2]. Based on these systems, analytical environments are built that are able to indicate to the head the direction of development of the enterprise, which will achieve the greatest productivity growth.

Therefore, it is urgent to develop a secure consolidated information resource for analyzing the activities of the poultry industry, which will ensure the accounting and analysis of industry performance indicators and determine the prospects for the development of poultry farming in Ukraine [3].

So, *the object of research* is the process of consolidating business information. And *the aim of research* is creation of a secure consolidated information resource for analyzing the activities of the poultry industry in Ukraine.

2. Methods of research

The development of a secure consolidated information resource leads to the following steps:

1) designing a database (DB) by the method of «entity-relationship»;

2) development of a normalized database of a consolidated information resource;

3) generating reports to display consolidated data;

4) information security in the database of the created consolidated resource.

3. Research results and discussion

3.1. Database design using the entity-relationship method. One of the basic stages of creating a consolidated information resource is the development of data models. Creating data models is the definition of entities, attributes, and their relationships. It is necessary to determine what information will be stored in a particular entity or attribute. An entity can be defined as an object, concept or event whose information needs to be stored. Objects should have names with exact semantic meaning, be called a noun in the singular [4].

When developing a database, it is necessary to focus on the end user, the analyst will make decisions based on the information provided. This allows, even at the stage of database development, to select the necessary data to fully display the necessary information [5].

Designing according to the «entity-relationship» method is carried out in the following order, as defined: entities, relationships, attributes, entity keys, degrees of relationship, membership classes.

To model the data, let's use the method of semantic modeling. This is a data structure modeling method based on the content of this data. As tools for the method of semantic modeling, it is possible to choose options for «entity-relationship» diagrams (ER). Thanks to the entity-relationship diagrams and visual graphic designation, let's model entities and their relationships. Based on the obtained data, let's construct the resulting ER diagram, shown in Fig. 1.

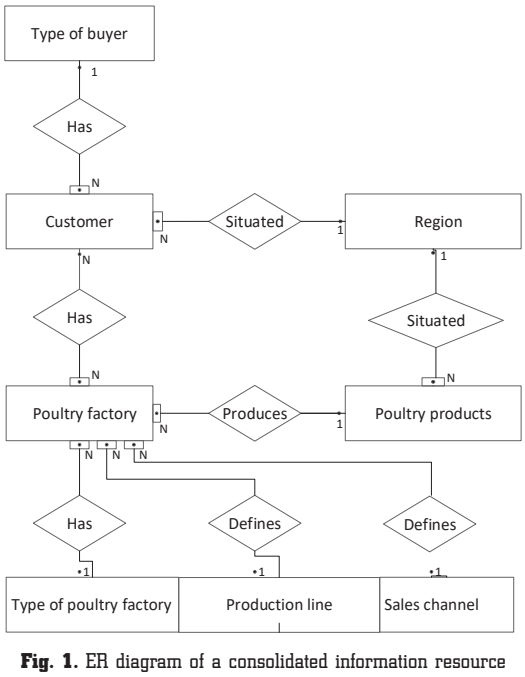

Fig. 1. ER diagram of a consolidated information resource

3.2. Development of a normalized database of a consolidated information resource. To systematize the information received and analyze the industry in detail, a database was developed using the MS SQL and JavaScript DBMS (database management system).

The Java language, the frameworks Spring, Hibernate and MySQL are used for work. Hibernate allows the automatic creation of database tables based on Java classes [6]. Each class should be stored in a database accompanied by special annotations that define the rules for storing classes in the database table and specify the relationship between them. Thanks to the use of this framework, the need to manually configure the database is minimized [7]. To view the automatically created database structure, let's use MySQL Workbench.

To display the relationships between tables, it is necessary to draw up a data schema that reflects the relationships between the database tables. Its appearance is depicted in Fig. 2.

The next stage of database design is the normalization of relations developed by the «entity-relationship» method, which allows to check the database for integrity anomalies. Normalization is a step-by-step reverse process of decomposing (decomposing) the original database relationships into smaller and simpler relationships. Normalization is performed to eliminate unwanted dependencies between attributes, to eliminate redundancy, to eliminate insertion, updating, and deletion.

3.3. Reporting to display consolidated data. The result of the work of the created consolidated information resource is reports received according to various criteria.

In Fig. 3 thanks to the work of a consolidated information resource, a report has been created that reflects the structure of poultry stock in Ukraine.

As can be seen from the report in Fig. 3, the number of poultry in the population decreases during the investigated period, while in agricultural enterprises it grows (from 45 % and 55 % in 2005 to 68 % and 32 % in 2019). For a more detailed analysis, let's generate a report by regions (Fig. 4) as of September 30, 2019.

Comparing the prices of poultry meat, it is worth noting that it is the cheapest on the meat market and one of the best in terms of product quality compared to other types. This makes it accessible and more popular by the population [9, 10]. So, poultry meat production is constantly growing (Fig. 5).

To analyze sales, namely, export of chicken eggs in 2018, let's create a report, which is reflected in Fig. 6.

3.4. Information security in the database of the created consolidated resource. Information protection in the database of the created consolidated resource occurs through the use of MS SQL, which is a high-class server, provides management of the developed database, its safety and stability, and guarantees a high level of data protection.

In addition, an SSL certificate is used to protect the user's personal data – a cryptographic protocol that establishes a secure connection between the client and server. The protocol creates a confidential data exchange between the client and the server using the TCP/IP protocol, and the authors use the asymmetric public key algorithm for encryption.

ISSN 2664-9969

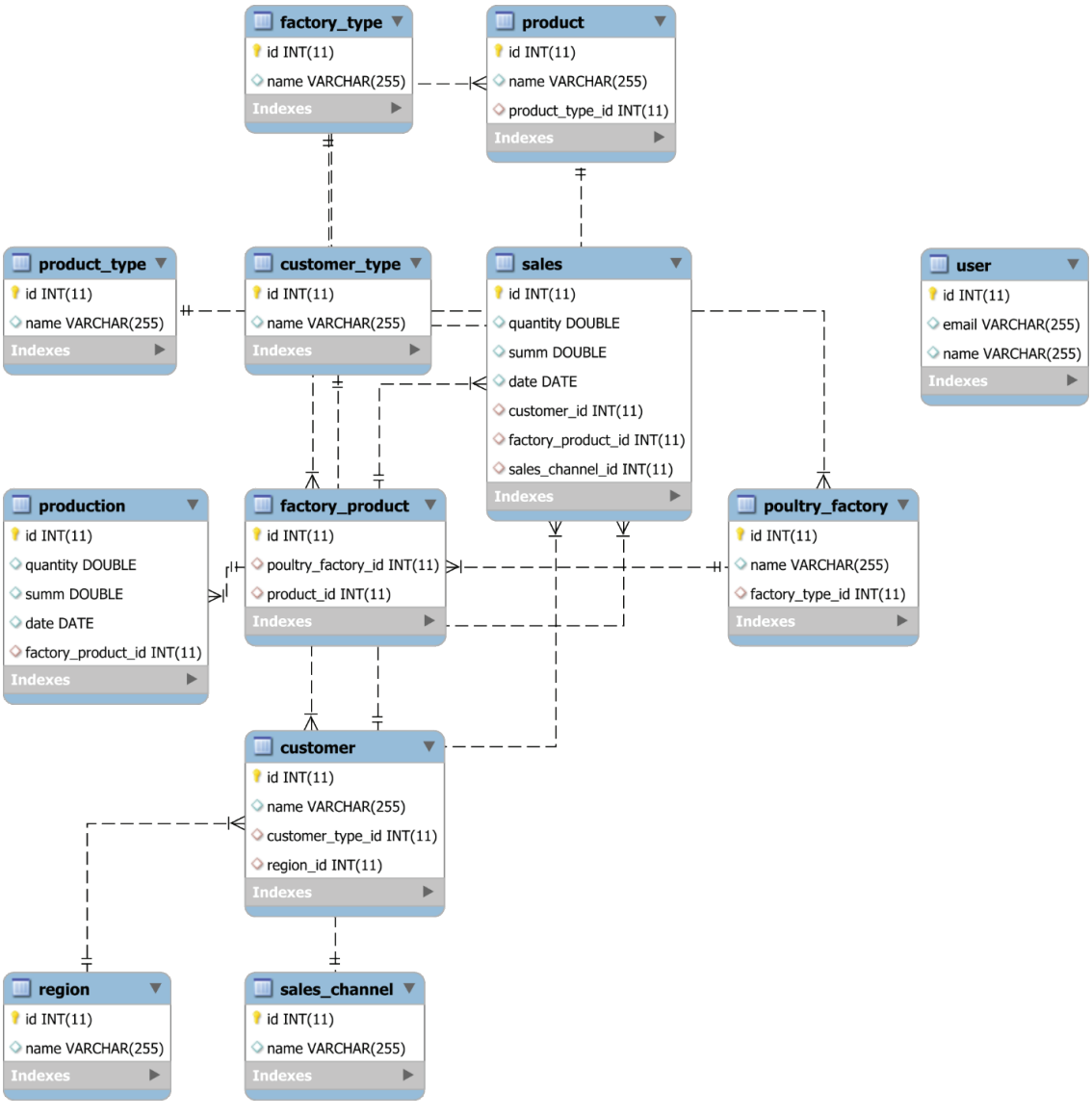

Fig. 2. Consolidated resource database schema

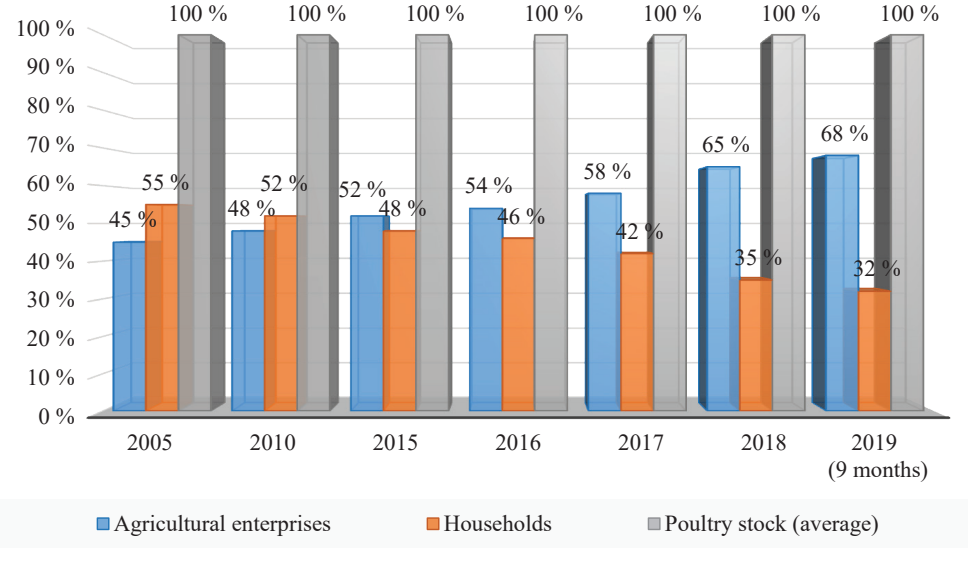

Fig. 3. Report on the structure of poultry stock in Ukraine [8]

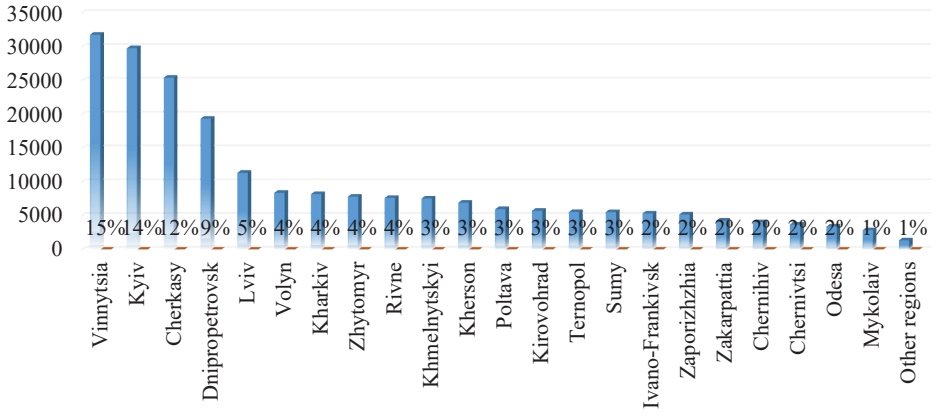

Fig. 4. Report – rating of regions by poultry stock in Ukraine

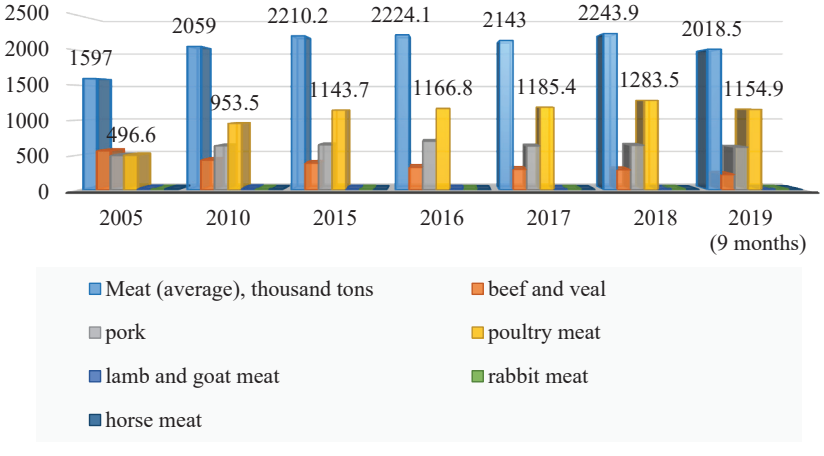

Fig. 5. Report on the structure of livestock production in Ukraine for 2005–2019 (thousand tons)

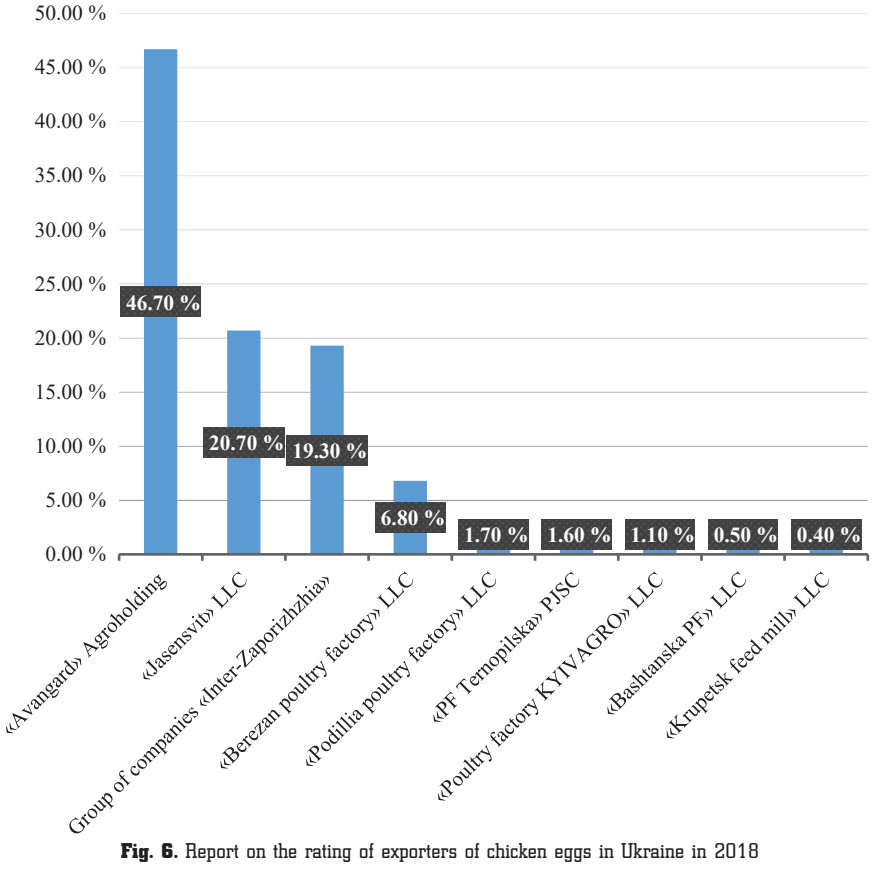

Fig. 6. Report on the rating of exporters of chicken eggs in Ukraine in 2018

ISSN 2664-9969

4. Conclusions

In this paper, a necessity to create a consolidated information resource (CIR) for analyzing the activities of the poultry industry in Ukraine is analyzed. To systematize the information received and analyze the industry in detail, a database was developed using the MS SQL and JavaScript databases. For the work of CIR it is proposed to use the Java language and the frameworks Spring, Hibernate and MySQL.

The effectiveness of developing a consolidated information resource for analyzing the activities of the poultry industry has been proved due to the ease of use of the database, the ability to obtain detailed information for the analysis of a particular industry as a whole, or to detail individual processes of such a business.

The development and implementation of a consolidated information resource allows to systematize data on poultry products, provides complete control over the process of determining data, its processing and use, facilitates the processing of large amounts of information.

References

1. Vinichenko, I. I., Makhovskyi, D. V. (2015). Stan ta perspektyvy rozvytku ptakhivnychykh pidpryiemstv v Ukraini. *Ahrosvit, 24,* 3–6.
2. Kunanets, N. E., Pasichnyk, V. V. (2010). *Vstup do spetsialnosti «Konsolidovana informatsiia»*. Lviv: Lvivska politekhnika, 196.
3. Matviienko, O. V. (2010). Funktsii informatsiinykh analitykiv u protsesi pidhotovky pryiniattia upravlinskykh rishen. *Naukovi pratsi Natsionalnoi biblioteky Ukrainy im. V. I. Vernadskoho, 5,* 350.
4. Berko, A. Yu. (2013). *Systemy upravlinnia bazamy danykh ta znan*. Lviv: Mahnoliia-2006, 680.
5. Lobok, O. P. (2013). *Orhanizatsiia baz danykh ta znan. Teoretychni osnovy proektuvannia, realizatsii ta vykorystannia baz danykh*. Kyiv: NUKhT, 262.
6. Mulesa, O. Yu. (2015). *Osnovy movy zapytiv SQL*. Uzhhorod: Uzhhorodskyi NU, 48.
7. Gulden, M. (2019). *Bootstrapping Hibernate 5 with Spring*. Baeldung. Available at: https://www.baeldung.com/hibernate-5-spring
8. *Derzhavna sluzhba statystyky Ukrainy* (2018). Available at: http://ukrstat.gov.ua/
9. Ishchenko, Yu. B. (2013) *Ptakhivnytstvo Ukrainy: analitychnyi ohliad*. Kharkiv, 74.
10. Prokopenko, O. R. (2018). *Tvarynnytstvo Ukrainy v 2017 rotsi. Statystychnyi zbirnyk*. Kyiv: Derzhavna sluzhba statystyky Ukrainy, 165.

Azarova Anzhelika, *PhD, Professor, Department of Management and Security of Information Systems, Vinnytsia National Technical University, Ukraine, e-mail: azarova.angelika@gmail.com, ORCID: http://orcid.org/0000-0003-3340-5701*

Shiyan Anatoliy, *PhD, Associate Professor, Professor of Department of Management and Security of Information Systems, Vinnytsia National Technical University, Ukraine, e-mail: anatoliy.a.shiyan@gmail.com, ORCID: http://orcid.org/0000-0002-5418-1498*

Mironova Yulia, *PhD, Associate Professor, Department of Management and Security of Information Systems, Vinnytsia National Technical University, Ukraine, e-mail: mironova@vntu.edu.ua, ORCID: http://orcid.org/0000-0002-2010-3838*

Shturma Liudmyla, *Department of Management and Security of Information Systems, Vinnytsia National Technical University, Ukraine, e-mail: lyudmilazagoruy@.ukr.net, ORCID: http://orcid.org/0000-0002-9242-6521*