

**INFORMATION AND ANALYTICAL PROVISION
OF ASSESSMENT OF THE SITUATION AND
DEVELOPMENT OF BUSINESS ENTITIES**

COLLECTIVE MONOGRAPH

eBook ISBN 978-80-88415-82-4

***PRAHA
OKTAN PRINT
2022***

UDC 316.334.23:004(02.064)

Recommended for publication by the Academic Counsel of Kryvyi Rih National University
(Minutes № 2 of April 26, 2022)

Reviewers:

Vakulchyk Olena Mykhailivna, Doctor of Economics, Professor, Head of the Department of Accounting, Auditing, Analysis and Taxation, University of Customs and Finance (Dnipro)

Herasymenko Serhii Serhiiovych, Doctor of Economics, Professor, Head of the Department of Statistics and Mathematical Methods in Economics, National Academy of Statistics, Accounting and Auditing (Kyiv)

Kulynych Roman Omelianovych, Doctor of Economics, Professor, Head of the Department of Mathematics, Statistics and Information Technologies, Leonid Yuzkov Khmelnytsky University of Management and Law (Khmelnytsky)

Information and analytical support for assessing the state and development of economic entities: collective monograph. Praha: OKTAN PRINT, 2022. – 461 c. –Language Ukrainian and English

The monograph describes the methodological aspects of information support for assessing the state and development of organizations. Methods of digitalization of accounting and management in the context of globalization are considered. Examples of practical use of modern methods of evaluating the work of organizations in various fields of activity in Ukraine and the world are given. The results of the study are accompanied by the necessary statistical analytical data, illustrations, key concepts and categories.

The monograph has scientific and practical significance and is intended for teachers, researchers and managers, masters, graduate students of economic specialties.

No part of this eBook may be reproduced or transmitted in any form or by any means, electronic, mechanical, recording, or otherwise, without written consent from the Publisher

The publication is assigned with a DOI number: **<https://doi.org/10.46489/IAASFA-14>**

The paper version of the publication is the original version. The publication is available in electronic version on the website: **<https://www.oktanprint.cz/p/information-and-analytical-support-for-asesing-the-state>**

Passed for printing 26.04.2022

eBook **ISBN 978-80-88415-82-4**

OKTAN PRINT s.r.o.

5. května 1323/9, Praha 4, 140 00

www.oktanprint.cz

tel.: +420 770 626 166

jako svou 123. publikací

Vydání první

© Copyright by OKTAN PRINT s.r.o., 2022

**ІНФОРМАЦІЙНО- АНАЛІТИЧНЕ
ЗАБЕЗПЕЧЕННЯ ОЦІНЮВАННЯ СТАНУ ТА
РОЗВИТКУ СУБ'ЄКТІВ ГОСПОДАРЮВАННЯ**

КОЛЕКТИВНА МОНОГРАФІЯ

eBook ISBN 978-80-88415-82-4

***ПРАГА
ОКТАН PRINT
2022***

УДК 316.334.23:004(02.064)

Рекомендовано до друку Вченою радою Криворізького національного університету (протокол № 2 від 26 квітня 2022 р.)

Рецензенти:

Вакульчик Олена Михайлівна, доктор економічних наук, професор, завідувач кафедри обліку, аудиту, аналізу і оподаткування Університету митної справи та фінансів (м. Дніпро)

Герасименко Сергій Сергійович, доктор економічних наук, професор, завідувач кафедри статистики та математичних методів в економіці, Національна академія статистики, обліку та аудиту (м.Київ)

Кулинич Роман Омелянович, доктор економічних наук, професор, завідувач кафедри математики, статистики та інформаційних технологій, Хмельницький університет управління та права імені Леоніда Юзькова (м. Хмельницький)

Інформаційно-аналітичне забезпечення оцінювання стану та розвитку суб'єктів господарювання : колективна монографія. / за заг. ред. д-ра економ. наук, проф. О.К. Єлісєєва. Прага: Октан Принт, 2022. – 461 с. – Мова укр. і англ

У монографії описані методологічні аспекти інформаційного забезпечення оцінювання стану та розвитку організацій. Розглядається методи діджиталізації обліку та управління в умовах глобалізації. Наведені приклади практичного використання сучасних методів оцінювання роботи організацій різних сфер діяльності в Україні та світі. Результати дослідження супроводжуються необхідними статистичними аналітичними даними, ілюстраціями, ключовими поняттями і категоріями.

Монографія має науково-практичне значення й розрахована на викладачів, наукових працівників та менеджерів, магістрів, аспірантів економічних спеціальностей.

The publication is assigned with a DOI number: <https://doi.org/10.46489/IAASFA-14>

The paper version of the publication is the original version. The publication is available in electronic version on the website: <https://www.oktanprint.cz/p/information-and-analytical-support-for-assesing-the-state>

Passed for printing 26.04.2022

eBook ISBN 978-80-88415-82-4

OKTAN PRINT s.r.o.
5. května 1323/9, Praha 4, 140 00
www.oktanprint.cz
tel.: +420 770 626 166
jako svou 123. publikaci
Vydání první

© Copyright by OKTAN PRINT s.r.o., 2022

CONTENT

INTRODUCTION	7
CHAPTER 1	9
DESIGNING A SECURE CONSOLIDATED INFORMATION RESOURCE FOR ANALYSIS OF OUTSOURCING COMPANIES' ACTIVITY IN UKRAINE	
1.1 Role and importance of outsourcing in modern business processes	9
1.2 Features of the outsourcing companies sphere in Ukraine under the conditions of pandemic of coronavirus	10
1.3 The essence and methods of information consolidation	13
1.4 Definition of tools for designing the interface of a consolidated information resource for analysis of outsourcing companies' activity in Ukraine	21
1.5 Substantiation of programming language choosing for the development of a consolidated information resource	24
1.6 Designing a secure consolidated information resource for analysis of outsourcing companies' activity in Ukraine	27
1.7 Normalization of relations in the proposed ER-model	29
1.8 Creation of tables for building the consolidated information resource	33
1.9 Creation forms in the consolidated information resource	34
1.10 Creation of orders for building the consolidated information resource	36
1.11 Secure information technologies of outsourcing company's management	40
CHAPTER 2 METHODOLOGICAL ASPECTS OF ANALYSIS AND EVALUATION OF THE BANKING SERVICES MARKET	46
2.1 Definition of banking services, their types and characteristics	46
2.2 Methodical approaches to information security of banks	58
2.3 Methods of evaluating the activities of banks	66
2.4 Statistical analysis of the European banking market	86

2.5 Assessment of the banking services market in Ukraine	110
CHAPTER 3 INFORMATION PROVISION OF MANAGEMENT OF EXPENDITURE ON HUMAN CAPITAL DEVELOPMENT OF BUSINESS ENTITIES	138
3.1 Methodical approaches to measuring the value of human capital in the context of personnel development management	138
3.2 Classification of costs for the maintenance and development of personnel in statistical and accounting	152
3.3 Theoretical and methodological approaches to the capitalization of human capital and the recognition of human assets in accounting	167
CHAPTER 4 FEATURES OF ACCOUNTING AND FORMATION OF REPORTING INDICATORS FOR ANALYSIS OF INVENTORIES IN INDUSTRIAL ENTERPRISE	185
4.1 Industrial development in Ukraine	185
4.2 Economic essence of inventories, their classification and valuation	194
4.3 Documentation of inventory accounting operations	214
4.4 Information systems and technologies of inventory accounting	223
4.5 Disclosure of information on production inventories of an industrial enterprise in the financial statements in the conditions of application of NP (S) BU and IFRS	230
4.6 Theoretical and methodological bases of inventory analysis	240
CHAPTER 5 INTELLECTUAL CAPITAL OF THE ENTERPRISE: ASPECTS OF ACCOUNTING AND GOVERNMENT REGULATION	256
5.1 Intellectual capital in the system of modern forms of capital	256
5.2 Methods of intellectual capital valuation	258
5.3 State regulation of intellectual capital valuation and accounting	270
5.4 Aspects of intellectual capital accumulation	277
5.5 The role of goodwill and franchising in the accumulation of intellectual capital	280

CHAPTER 6 ORGANIZATION OF AUDIT ACTIVITIES IN THE CONDITIONS OF INTRODUCTION OF INFORMATION AND COMMUNICATION TECHNOLOGIES	294
6.1 Model of organization of audit activity in Ukraine in the conditions of legislative changes	294
6.2 Audit risk assessment in the system of risk-oriented audit	297
6.3 Methods of assessing audit risk	302
6.4 Development of auditing activities based on the use of information and communication technologies	308
6.5 Analytical review of the audit software of Ukraine	313
CHAPTER 7 FEATURES OF APPLICATION OF MANAGEMENT INFORMATION SYSTEMS AT WHOLESALE TRADE ENTERPRISES	331
7.1 General principles of setting up management information systems	331
7.2 Pricing subsystem and its settings	335
7.3 Features of warehouse accounting in management information systems	344
CHAPTER 8 THE INFLUENCE OF HUMAN CAPITAL DEVELOPMENT AND MANAGEMENT ON INCREASING THE COMPETITIVENESS OF ENTERPRISES IN THE INNOVATIVE ECONOMY	370
8.1 The economic essence of the category of "human capital" and areas of investment in it	370
8.2 Assessment of the level of human capital development and the main parameters of its formation in terms of providing innovative work	380
8.3 Human capital management as a key factor in the innovative development of the enterprise and increase its competitiveness	388

CHAPTER 9 DIRECTIONS OF IMPROVEMENT OF STATISTICAL PROVISION OF PROCEDURES OF DEVELOPMENT OF THE STATE DEVELOPMENT STRATEGY AND EVALUATION OF IT IN ACCORDANCE WITH IT	416
9.1 Forecast of regional development as a methodological basis for developing scenarios of the Strategy for the period up to 2027	416
9.2 The essence of European principles of regional development programming	431
9.3 Improving the methodology for developing the DSRD based on European principles of regional development programming	444
INFORMATION ABOUT THE AUTHORS OF THE COLLECTIVE MONOGRAPH	459

ЗМІСТ

ВСТУП	7
РОЗДІЛ 1 ПРОЕКТУВАННЯ БЕЗПЕЧНОГО КОНСОЛІДОВАНОГО ІНФОРМАЦІЙНОГО РЕСУРСУ ДЛЯ АНАЛІЗУ ДІЯЛЬНОСТІ АУТСОРСИНГОВИХ КОМПАНІЙ В УКРАЇНІ	9
1.1 Роль і значення аутсорсингу в сучасних бізнес-процесах	9
1.2 Особливості сфери аутсорсингових компаній в Україні в умовах пандемії коронавірусу	10
1.3 Сутність і методи консолідації інформації	13
1.4 Визначення інструментів для проектування інтерфейсу зведеного інформаційного ресурсу для аналізу діяльності аутсорсингових компаній в Україні	21
1.5 Обґрунтування вибору мови програмування для розробки зведеного інформаційного ресурсу	24
1.6 Створення безпечного консолідованого інформаційного ресурсу для аналізу діяльності аутсорсингових компаній в Україні	27
1.7 Нормалізація зв'язків у запропонованій ER-моделі	29
1.8 Створення таблиць для побудови зведеного інформаційного ресурсу	33
1.9 Форми створення в зведеному інформаційному ресурсі	34
1.10 Створення замовлень на побудову зведеного інформаційного ресурсу	36
1.11 Захищені інформаційні технології управління аутсорсинговою компанією	40
РОЗДІЛ 2 МЕТОДОЛОГІЧНІ АСПЕКТИ АНАЛІЗУ ТА ОЦІНКИ РИНКУ БАНКІВСЬКИХ ПОСЛУГ	46
2.1 Визначення банківських послуг, їх види та характеристики	46
2.2 Методичні підходи до інформаційної безпеки банків	58
2.3 Методи оцінки діяльності банків	66
2.4 Статистичний аналіз європейського ринку банківських послуг	86

2.5 Оцінювання ринку банківських послуг в Україні	110
РОЗДІЛ 3 ІНФОРМАЦІЙНЕ ЗАБЕЗПЕЧЕННЯ УПРАВЛІННЯ ВИТРАТАМИ НА РОЗВИТОК ЛЮДСЬКОГО КАПІТАЛУ СУБ'ЄКТІВ ГОСПОДАРЮВАННЯ	138
3.1 Методичні підходи до виміру вартості людського капіталу в контексті управління розвитком персоналу підприємств	138
3.2 Класифікація витрат на утримання та розвиток персоналу в статистичному і бухгалтерському обліку	152
3.3 Теоретико-методичні підходи до капіталізації людського капіталу і визнання людських активів в бухгалтерському обліку	167
РОЗДІЛ 4 ОСОБЛИВОСТІ ОБЛІКУ ТА ФОРМУВАННЯ ПОКАЗНИКІВ ЗВІТНОСТІ ДЛЯ АНАЛІЗУ ВИРОБНИЧИХ ЗАПАСІВ НА ПРОМИСЛОВОМУ ПІДПРИЄМСТВІ	185
4.1 Розвиток промисловості в Україні	185
4.2 Економічна сутність виробничих запасів, їх класифікація та оцінка	194
4.3 Документування операцій з обліку виробничих запасів	214
4.4 Інформаційні системи і технології обліку виробничих запасів	223
4.5 Розкриття інформації про виробничі запаси промислового підприємства у фінансовій звітності в умовах застосування НП(С)БО та МСФЗ	230
4.6 Теоретико-методичні основи аналізу виробничих запасів	240
РОЗДІЛ 5 ІНТЕЛЕКТУАЛЬНИЙ КАПІТАЛ ПІДПРИЄМСТВА: АСПЕКТИ ОБЛІКУ І ДЕРЖАВНОГО РЕГУЛЮВАННЯ	256
5.1 Інтелектуальний капітал в системі сучасних форм капіталу	256
5.2 Методи оцінки інтелектуального капіталу	258
5.3 Державне регулювання оцінки та обліку інтелектуального капіталу	270

5.4 Аспекти нагромадження інтелектуального капіталу	277
5.5 Роль гудвілу і франчайзингу у нагромадженні інтелектуального капіталу	280
РОЗДІЛ 6 ОРГАНІЗАЦІЯ АУДИТОРСЬКОЇ ДІЯЛЬНОСТІ В УМОВАХ ЗАПРОВАДЖЕННЯ ІНФОРМАЦІЙНО-КОМУНІКАЦІЙНИХ ТЕХНОЛОГІЙ	294
6.1 Модель організації аудиторської діяльності в Україні в умовах законодавчих змін	294
6.2 Оцінювання аудиторського ризику в системі ризикоорієнтованого аудиту	297
6.3 Методи оцінювання аудиторського ризику	302
6.4 Розвиток аудиторської діяльності на основі використання інформаційно-комунікаційних технологій	308
6.5 Аналітичний огляд програмного забезпечення аудиторської діяльності України	313
РОЗДІЛ 7. ОСОБЛИВОСТІ ЗАСТОСУВАННІ УПРАВЛІНСЬКИХ ІНФОРМАЦІЙНИХ СИСТЕМ НА ПІДПРИЄМТСВАХ ОПТОВОЇ ТОРГІВЛІ	331
7.1 Загальні принципи налаштування управлінських інформаційних систем	331
7.2 Підсистема ціноутворення та її налаштування	335
7.3 Особливості складського обліку в управлінських інформаційних системах.	344
РОЗДІЛ 8. ВПЛИВ РОЗВИТКУ ТА УПРАВЛІННЯ ЛЮДСЬКИМ КАПІТАЛОМ НА ПІДВИЩЕННЯ КОНКУРЕНТОСПРОМОЖНОСТІ ПІДПРИЄМСТВ В УМОВАХ ІННОВАЦІЙНОЇ ЕКОНОМІКИ	370
8.1 Економічна сутність категорії «людський капітал» та напрями інвестування в нього	370

8.2. Оцінювання рівня розвитку людського капіталу та головні параметри його формування в аспекті забезпечення інноваційної праці	380
8.3. Управління людським капіталом як ключовий фактор інноваційного розвитку підприємства та підвищення його конкурентоспроможності	388
РОЗДІЛ 9 НАПРЯМИ ВДОСКОНАЛЕННЯ СТАТИСТИЧНОГО ЗАБЕЗПЕЧЕННЯ ПРОЦЕДУР РОЗРОБЛЕННЯ СТРАТЕГІЇ ДЕРЖАВНОГО РОЗВИТКУ ТА ОЦІНЮВАННЯ ЇЇ ВІДПОВІДНОСТІ ЄВРОПЕЙСЬКИМ ПРИНЦИПАМ ПРОГРАМУВАННЯ РОЗВИТКУ РЕГІОНІВ	416
9.1 Прогноз розвитку регіонів як методологічна основа розроблення сценаріїв Стратегії на період до 2027 року	416
9.2 Сутність європейських принципів програмування розвитку регіонів	431
9.3 Вдосконалення методології розроблення ДСРР на основі європейських принципів програмування розвитку регіонів	444
ВІДОМОСТІ ПРО АВТОРІВ КОЛЕКТИВНОЇ МОНОГРАФІЇ	459

ВСТУП

В умовах активного розвитку діджіталізації в Україні і поширення новітніх стандартів інформаційного суспільства особливо зростає значення ефективного управління процесами як на рівні країни, регіону, його територіальних одиниць, так і на рівні господарюючих суб'єктів.

З провадженням нових інформаційних технологій, зокрема розвиток засобів обчислювальної техніки, зв'язку, систем телекомунікації, інформація стає постійним і необхідним атрибутом забезпечення діяльності держави, юридичних осіб, громадських організацій, менеджерів підприємств та підрозділів. Від якості та достовірності інформації залежить ефективність та оперативність рішень, що приймаються на різних рівнях управління.

Головною метою інформаційної політики на рівні країни має стати створення оптимальних умов для забезпечення інформативних потреб менеджерів на основі формування та використання інформаційних ресурсів і сучасних інформаційних технологій. Отже, першочерговим завданням діджіталізації країни є побудова системи інформаційно-аналітичного забезпечення управлінської діяльності, яка являє собою складну, інтегровану, ієрархічно організовану систему, призначену для прийняття ефективних управлінських рішень.

Концептуального значення набуває розробка новітніх підходів до інформаційно-аналітичного забезпечення. У зв'язку з цим актуальним питанням на сьогодні є вдосконалення та розробка нових методів інформаційно-аналітичного забезпечення систем управління.

Дослідження науковців, представлених у монографії, дозволяє органічно поєднати індивідуальні та колективні знання фахівців

різноманітних наукових шкіл. Монографія має науково-практичне значення й розрахована на наукових працівників та менеджерів, викладачів, магістрів, аспірантів економічних спеціальностей.

Автори наукової монографії виражають слова визнання і вдячності рецензентам: доктору економічних наук, професору, завідувачки кафедри обліку, аудиту, аналізу і оподаткування Університету митної справи та фінансів (м. Дніпро) **Олені Вакульчик**, професору, завідувачу кафедри статистики та математичних методів в економіці, Національна академія статистики, обліку та аудиту **Сергію Герасименко**, доктору економічних наук, професору, завідувачу кафедри статистики та інформаційних технологій, Хмельницький університет управління та права імені Леоніда Юзькова **Роману Кулиничу**

CHAPTER 1

DESIGNING A SECURE CONSOLIDATED INFORMATION RESOURCE FOR ANALYSIS OF OUTSOURCING COMPANIES' ACTIVITY IN UKRAINE

1.1 Role and importance of outsourcing in modern business processes

Outsourcing is a concept that determines a set of means aimed to transferring certain processes and functions of an enterprise to another organization that specializes professionally in this field. Making a strategic decision of outsourcing, the customer will gain access to the existing business process, individual systems and infrastructure of external companies, concentrating on conducting specialized activities in their company, increasing own part in market.

Outsourcing companies are becoming in demand precisely because of their strait specialization. It's allows customers to receive the highest quality service.

In addition to the presence of high-class specialists, outsourcing has a lot of other advantages, in particular, clients do not need:

- recruit staff;
- accrue a salary;
- make training and certification;
- pay out a social package;
- calculate taxes.

However, the most important benefits will be the economic benefits:

1. Here the role is played not only by the level of specialists but also the most modern equipment of firms and the availability of advanced technologies. This is due to the fact that the performer is employed in a special limited area.

2. A large number of customers of the outsourcing agency allow distributing overhead costs and optimize work which leads to lower costs and improve their quality.

There are many types of outsourcing. However, in practice there are the following areas:

Industrial. Part of the production functions is transferred to third-party manufacturers. An example is the relationship between the advertising agency and the printing house.

Transfer of business processes. A separate direction is transferred for example logistics, bookkeeping, marketing.

Knowledge management. Processes that require wide study or serious analysts of large sets of data, creation and management of databases delegate to other enterprises, firms.

The concept of consolidated information covers sources of information obtained from several sources and systematically integrated different types of information resources which are complete, holistic and consistent and represent an adequate information model of the problem area. It allows to analyze, develop and effectively use such a resource in decision support processes [1–10].

1.2 Features of the outsourcing companies sphere in Ukraine under the conditions of pandemic of coronavirus

The most common is IT-outsourcing, i.e. outsourcing of information technology in particular work on the creation and maintenance of software products. It is clear that in this way there is a possibility of a significant reduction in the cost of salaries of programmers and the maintenance of IT-departments of large corporations. To reduce them it is advisable to abandon the full staff of programmers and transfer some of their work to other companies, in many cases – abroad (offshore programming) which is much cheaper. Thus, the difference in salary «inside» the company and «outside» (outside the country) caused the «offshore programming» as a business direction.

In the world ranking of software manufacturers Ukraine ranks 15th. There are about a thousand software development companies in the country: about 25-30 thousand Ukrainian specialists are employed in the field. Around 2006 Ukraine became a full-fledged player in the field of outsourcing.

In 2016 Ukraine has risen to 24th place in the Global Services Location Index in the outsourcing services market.

In recent years, the information technology market of Ukraine is gaining significant momentum, growing annually by 20%–25%. Taking into account these dynamics, most experts have already called this industry the engine of the entire Ukrainian economy. Since 2013 the contribution of this industry to Ukraine's gross domestic product has increased from 1.58% to 8.3% due to increased exports of technological services.

Today there are about 4,000 Ukrainian technology companies in the local market, mainly specializing in software development and testing, application support, technology research and development. As for the types of IT companies, there are about 1,702 product and 533 service companies in Ukraine which specialize in IT outsourcing. In addition to a significant number of companies, Ukraine is also known for its progressive IT startups (currently there are about 2,000). Among the most famous are Grammarly, People.ai, Readdle, Attendify, MacPaw, Reface, Ajax, Petcube, Restream, Competera and others. In 2021, Ukrainian startups managed to attract a record amount of investment - more than 571 million dollars which was a powerful impetus for the rapid development of Ukrainian IT business.

According to the Outsourcing Journal Ukraine has become the «number 1» country for IT outsourcing in Central and Eastern Europe and is among the top 20 countries in the EMEA (Europe, the Middle East and Africa) region for IT offshoring. Ukraine is now seen as a promising technology hub with a fast-growing IT industry which has attracted the attention of the global IT community, encouraging more and more foreign companies to hire Ukrainian developers.

It should be noted that Ukraine is known not only for the IT outsourcing industry, but also for providing offshore services for the opening of R&D centers. Many countries are interested in receiving these services, but companies from the United States and Western Europe remain regular customers.

Among the main factors that attract foreign companies to the Ukrainian IT market are the following:

- a large number of talented IT specialists;
- good location;
- low taxes (5%) and salary;
- quality work;
- similarity at the cultural level.

Technology giants such as Google, Oracle, Samsung, Amazon, Ericsson, Amadeus and Huawei have already successfully opened their R&D offices in Ukraine. In addition, not only foreign companies, but also some Ukrainian startups based abroad are creating their offshore development centers here in order to optimize the work process of their business. One such striking example is People.ai, a Ukrainian software development company that has decided to open its own R&D center in Ukraine. This crucial step provided the company with access to a large number of artificial intelligence developers which allowed it to expand its core team with new talent programmers. By increasing their staff, People.ai was able to achieve incredible results. In just 3 years the cost of this startup has grown from \$ 400 million to \$ 1.1 billion, making People.ai a unicorn company.

Despite the fact that most companies have suffered from the effects of the COVID-19 pandemic [11–16], IT sector not only not experienced this negative impact, but has even been able to benefit from this unfavorable situation. Due to quarantine most companies were forced to switch to digital format which significantly increased the need for IT services. As a result, technology companies began to expand rapidly, increasing the need for skilled programmers. Given these events, in 2020-2021 the demand for Ukrainian specialists has grown significantly, as more and more foreign technology companies have hired them to develop

their products. This became especially noticeable when our clients began to actively receive investments and go exchange.

One such company is ThredUP, the largest online platform for selling second-hand clothes, which, thanks to the effective work of its Ukrainian team of programmers, not only managed to survive in conditions of the pandemic of coronavirus but also became a real sensation on the world market. ThredUP was able to enter the IPO and receive \$ 168 million in funding. Moreover, thanks to its own R&D center in Ukraine, the company is effectively expanding its business opportunities and improving its product, receiving ongoing support for the organization of the offshore center from Alcor.

Thus, the growth of the IT outsourcing industry and the volume of technical services have significantly affected the development of the Ukrainian IT market. According to the National Bank of Ukraine in 2021 the volume of Ukrainian IT exports increased by 20.4% which led to an increase in annual exports of these services to \$ 5 billion.

1.3 The essence and methods of information consolidation

The term «consolidated information» refers to sources of information obtained from several sources and systematically integrated, different types of information resources which are collectively endowed with features of completeness, integrity and consistency, and are an adequate information model of the problem area. Consolidated information is designed to analyze and effectively use it in decision support processes. Therefore, the concept of «competitive intelligence» which is used by some researchers, remains one aspect of holistic processes and procedures of information consolidation, namely as a process of forming information resources to decision-making support [17].

Consolidated information with the use of all opportunities actively manages information resources, develops technological bases for the creation of information products, provides quality and information transformation of information.

Information security can be provided in a variety of ways which include modeling the necessary components of information security, namely:

- identification of information sources which have to be protected;
- monitoring the full set of potential threats and channels of information leakage;
- analysis of vulnerabilities and risks associated with the collection of information and source channels;
- the choice of means of protective information and their implementation;
- control system protection.

Thus, integrated information technologies require information security in a particular institution or organization.

The process of information integration is the process of transforming data into business information and knowledge which is aimed at supporting informal solutions. That's why secure business information, in the broadest sense, is based on the principle of combining elements such as information, business processes, hardware, software, people [18].

Integration of information actions is used to determine the responsibility of individuals, departments or organizations to evaluate and compress important documents in order to provide reliable and concise knowledge for groups of users. Individuals or groups of persons engaged in information and integration activities are a unit of consolidation.

Thus, data consolidation refers to the use of several data cells that originate from a spreadsheet and compile cells into another sheet. The process does a great job of helping computer users personally and manually write down individual data cells from specific reference points and then enter them elsewhere using a new spreadsheet. Thus, the formatting, reorganization and redistribution of a huge amount of information can be greatly simplified.

Information consolidation programs require the fulfillment of certain conditions by spreadsheets and files, the data of which must be consolidated [19]. First of all, each of the large worksheets must share the same information range when analyzing in both its axes. This requirement

will help the computer program to consolidate data to complete a complex calculation; calculations are designed to determine the ability of each data cell to correspond to data belonging to other letters or pages. After completing the process the computer program is going to create a completely new sheet which is going to create a summary of all data belonging to the relevant tables.

As a matter of fact, information consolidation is the use of spectrum fields in broadband to more effectively organize the work of employees. Data consolidation is also a process that can lead to a significant improvement in the level of professional training. Doctors usually use data consolidation to keep accounting their patients and their treatment regimens. Teachers can take full advantage of data consolidation to create quick summaries of grades, tests, projects or assignments for their students. Retailers can also find great use in data consolidation when it comes to tracking the most profitable stores or products. It is clear that this is not an exhaustive list of all practical applications of data consolidation.

Therefore, there are a lot of people who want to pay for such services. Data consolidation software is also available for purchase. The peculiarity of these software applications is that they are not fully automated. They are completed with the help of several worksheets executed in several formats / programs. The presence of a person who has to summarize the data manually is often necessary, as spreadsheets do not meet pre-established requirements.

In today's reality, no company can operate effectively in a highly competitive environment without the latest, complete, reliable, relevant information, which is the basis of consolidated information products, such as reports, databases, research, technical notes and reviews [20].

Data consolidation is the initial stage of implementation of any analytical task or project. The basis of consolidation is the process of collecting and organizing data storage in a form that is optimal in terms of their processing on a specific analytical platform or solving a specific analytical problem.

The main criteria of optimality in terms of data consolidation are as follows (Fig. 1.1) [21]:

- providing high speed data access;
- compact storage;
- automatic maintenance of data structure integrity;
- data consistency control.

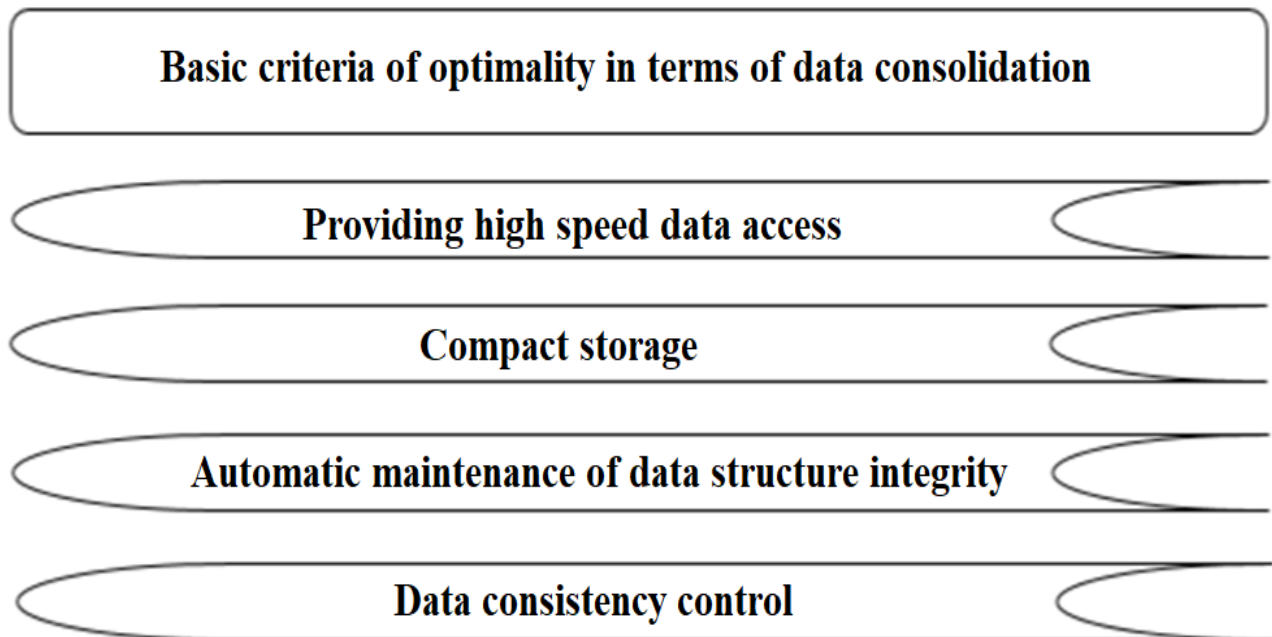


Figure 1.1 – The main criteria for optimality in terms of data consolidation

A key concept of consolidation is a data source, an object that contains structured data that can be useful for solving an analytical problem. It is necessary that the analytical platform used can access data from this object directly or after their conversion into another format. Otherwise, it is obvious that the object cannot be considered a data source.

Analytical activity on consolidated information – procedures and processes of intellectual activity that generate new information, allow identifying new problems or their aspects offering non-traditional ways to solve them.

Analytical applications, as a rule, do not contain developed means of data entry and editing, but work with already formed samples. Thus,

the formation of data sets for analysis in most cases should be done by customers of analytical solutions.

In the process of data consolidation the following tasks are solved:

- choice of data sources;
- development of consolidation strategy;
- data quality assessment;
- enrichment;
- cleaning;
- transfer to the data warehouse.

First, select the sources that contain data that may be relevant to the problem, then determine the type of sources and methods of organizing access to them.

Another important task to be solved during consolidation is to assess the quality of data in terms of their suitability for processing using various analytical algorithms and methods. In most cases, the source data is «dirty», i.e. it contains factors that do not allow to analyze it correctly, identify hidden structures and patterns, establishing links between data elements and to perform other actions that may be required to obtain an analytical solution.

Such factors include input errors, omissions, abnormal values, noise, inconsistencies. Therefore, before starting to analyze the data, it is necessary to assess their quality and compliance with the requirements of the analytical platform. If the quality assessment process reveals factors that do not allow the correct application of certain analytical methods to the data, it is necessary to perform appropriate data cleaning. Data cleaning – a set of methods and procedures aimed at eliminating the causes that interfere with the correct processing: anomalies, omissions, duplicates, inconsistencies, noise.

Another operation that may be required when consolidating data is their enrichment – the process of supplementing the data with some information which increases the efficiency of analytical tasks. Enrichment allows more efficient use of consolidated data. It should be used in cases where the data do not contain enough information to satisfactorily solve a particular problem of analysis. Data enrichment allows to increase their

information saturation and, as a consequence, significance for solving the analytical problem.

Only timely and verified information can predict changes and fluctuations in markets, political risks and certainly should not be known to competitors, so it is very important to organize reliable protection.

The protection of consolidated information can be provided in various ways, involving modeling of the necessary components of information security, namely:

- allocation of information resources to be protected;
- monitoring of the full set of potential threats and channels of information leakage;
- analysis of vulnerabilities and risks to the set of information and leakage channels;
- definition of requirements to the protection system;
- choice of means of information protection and their implementation;
- control of the protection system.

Thus, it can be concluded that consolidated information not only requires the right methods of analysis, but also information security within a particular institution or organization.

At the same time, the consolidated information is called, actively operating with information resources, to develop technological bases of creation of an information product, to carry out qualitative and semantic transformation of information, functionally intersecting in this plan with scientific (development of new knowledge) and management (development of solutions, scenarios) activities.

It is necessary to distinguish between physical consolidation – information actually collected in one place and logical consolidation or federated – information distributed, but from the point of view of the user, is in a single repository that has shared access to it and the same.

The main types of information consolidation products include:

- reviews: critical reviews, reports on the current state;
- reports: evaluation, marketing and technical reports;
- alarm bulletins or letters.

- data: compilations and tabular data; statistical compilations, correlations and compositions; critical data.
- databases: expert databases; knowledge base on subjects.
- technical records: guides, reference books, instruction sheets, explanations of a complex subject executed in style and language of the audience. Popular articles on scientific or technical topics.
- guidance: compilation of relevant data and information on the subject.
- critical research: comparison of different practices or policies with lists for and against; impact and future research.
- request: evaluation of research and compilations on demand.

Of course, each of these products has its own requirements, criteria and procedures.

Some of the products can be prepared with the help of analytical-synthetic processing of information.

Based on modern terminological dictionaries, standards, manuals, it can be established that the analytical-synthetic processing of information means the process of processing, collecting, introducing, writing, transforming, reading, storing, destroying, not registering for information purposes, comparison and generalization, which is, as correct, annotation, referencing, extraction of facts, preparation of reviews, compilation of bibliographic descriptions (BD), annotation, indexing.

The main types of analytical and synthetic processing of documents and information are defined in Government standard of Ukraine (DSTU 2394-94 Information and documentation. Completion of the fund, bibliographic description, analysis of documents) which meets the international standard ISO 5127 and include:

- bibliographic description;
- indexing;
- annotation;
- referencing;
- translation of scientific documents;
- collection, critical evaluation, systematization and generalization of scientific and technical data;

- compilation of reviews.

All listed types facilitate the search for consolidated information products.

Members of the union of analysts and professionals of competitive intelligence believe that professionals in the field of information and information analysis or analysts of consolidated information can provide information and analytical support to any institution, modeling its structure, areas of operation, taking into account interaction with the environment.

Such specialists can provide information and analytical support of management, performing meaningful processing of information. Graduates of this specialty can work in the services of information and document management of enterprises and institutions that use computer technology in personnel and office departments; information and information-analytical structures; marketing and forecasting departments, relevant departments of government, etc. Specialists of the new generation have the technology, methods of analysis, convolution and presentation of information, operate information arrays, form databases of various information resources, based on information models, identify objective patterns and trends, determine the driving mechanisms, causation.

Consolidated information has recently established itself as an independent scientific field, and its status is still debated, as in the development of information sciences there is a process of diversification of functions of each type of communication, continuous change of these functions under the changing demands of life.

1.4 Definition of tools for designing the interface of a consolidated information resource for analysis of outsourcing companies' activity in Ukraine

The peculiarity of information consolidation is the presentation of information about the company in a specially developed space and connection to the database of office documents on the network. You can provide information about a company on the Internet by creating a website that contains basic information about it or by creating a WWW server that provides much more features, as it can contain standard or specialized support, visual images of products, etc. Development of space consists of the following stages:

- 1) development and approval of original technical work;
- 2) development of a structured design site – location of sections, content and navigation;
- 3) implementation of the project – creation of spatial elements of layout, program style and navigation elements;
- 4) development of a database, program code, modules and other structural blocks of the site.

Thus, in the consolidated information resource of outsourcing companies for data storage, the tool MySQL is chosen by the author of this research – system management of relational databases, which integrates with PHP and provides the creation of static and dynamic Web-applications.

MySQL is based on the client-server model. The core of MySQL is a MySQL server that handles all database instructions (or commands). The MySQL server is available as a separate program for use in a client-server network environment and as a library that can be embedded (or linked) into other programs.

MySQL works with several utilities that support MySQL database administration. Commands are sent to MySQLServer through a MySQL client that is installed on the computer.

MySQL was originally designed for fast processing of large databases. Although MySQL is usually installed on only one machine, it

can send a database to multiple locations, because users can access it through various MySQL client interfaces. These interfaces send SQL statements to the server and then display the results.

Until 2016, the main difference between MySQL and SQL was that MySQL could be used on multiple platforms, and SQL could only be used on Windows. Since then, Microsoft has expanded SQL to support Linux, a change that took effect in 2017. When MySQL is installed through Linux, its system package management requires special configuration to configure security and optimization settings [22].

MySQL also allows users to select the most efficient storage mechanism for any spreadsheet, because the program is able to use multiple storage systems for individual tables. One of the MySQL engines is InnoDB. InnoDB was designed for high availability. Because of this, it is not as fast as other engines. SQL uses its own system data storage, but supports numerous safeguards against data loss. Both systems are able to work in clusters for high availability.

SQL Server offers a wide range of data analysis and reporting tools. SQL Server Reporting is the most popular and available as a free download. There are similar analytics tools for MySQL, available from third-party software companies such as Crystal Report XI and Actuate BIRT.

In a relational MySQL database data is stored in separate tables thanks to which the gain in speed and flexibility is achieved. Tables are linked together by relationships, thanks to which it is possible to combine data from several tables when performing request. SQL as a partial system MySQL can be described as a structured request language used to access databases.

MySQL is open source software. Anyone can apply and modify it. Such software can be obtained using the Internet and used free of charge. In this case each user can study the source code and change it in accordance with their needs.

MySQL consists of two parts: server and client.

The MySQL server is constantly functioning on your computer. Client programs (for example, PHP scripts) send server MySQL SQL-

requires through the mechanism of socketin (i.e. by means of network means), the server processes them and remembers result. That is, the script (client) indicates what information it wants to receive from the database server. Then the database server will send the answer (result) to the client (script).

MySQL structure has three-level: databases, tabular, records.

Databases and tabular MySQL are physically represented by files with extensions frm, MYD, MYI. Logically, the table is a set of records. A record is a set of fields of different types. The MySQL database name is unique within the system, and the tabular names are unique within the database, and the fields are unique within the table. One MySQL server can support several databases at once, access to which can be distinguished by login and password.

A database in MySQL is a regular catalog that contains files of a formatted tabular format. Spreadsheets consist of records, and records, in turn, consist of fields. The field has two attributes – name and type.

The experience of using databases is so great that many conceptual things have become commonplace. But an example of how objectively and naturally the concept of compatibility has faded into the background allows us to note: not all tabular databases are «rectangular» and absolutely not all relationships in the database are «relational».

In general, the appearance in the databases of fields of variable length in itself indicates that not everything fits into the usual framework. Not every table has headers, not all rows must have all the fields that are provided by the structure of the table. And the table can have the data determining its structure, instead of on the contrary.

It's is increasingly normal and natural. Widely used object-oriented programming in the context of databases, especially in PHP / MySQL, allows you to create system objects that write themselves to the database. However, since these objects are not necessarily always the same as they were at the time of creation, table databases can change dynamically when dynamic objects are stored. In the simplest case, a modern table is a row or a system of rows, the length does not matter here, it can be emulated at the level of database tables. But the use of objects allows you to emulate

the desired properties of data and abstract from the rigid structure, relational ideas, tables and the usual strict syntax of working with data.

Because this software-consolidated resource was developed on the basis of MySQL database which allows you to solve the whole problem. Among the known analogues should be noted: the possibility of creating a similar resource on the basis of DBMS «FileMaker» and «FoxPr» [23].

Since the creation of such a software-consolidated resource is quite a specific task, we consider only the basic functionality of the above systems of analogues.

This window is filled with information of the developer's choice. That is, if a database table is being developed, the form will contain all the data entered in the table, all columns and rows, entity names, and other information directly related to the created table.

1.5 Substantiation of programming language choosing for the development of a consolidated information resource

C# is a general-purpose language designed for developing applications on the Microsoft platform [24].

C# is often seen as a hybrid that takes the best of C and C++ to create a truly upgraded language. Although the .NET Framework supports several other encoding languages, C # has quickly become one of the most popular.

C# can be used to create applications and games for the Windows desktop, to develop web applications and is becoming increasingly popular for mobile applications. Cross-platform tools such as Xamarin allow applications written in C# to be used on virtually any mobile device.

C# was designed to be simple and easy to use. Because C# is a high-level language, it is somewhat closer to English. In addition, C# is abstracted from most complex machine (computer) parts so that the developer can focus on programming rather than worrying about small details that are considered boring and difficult.

As a lower-level language than higher-level languages such as Python, it may take longer to master and sometimes it may take a little more code to get a working prototype, but it is easier.

C# – is a language with static typography, i.e. the code generated will be checked for errors before it is embedded in the program. Errors will be easier to track and because static-typed languages are also more rigorous when encoding, the code base will generally be more consistent and thus easier to maintain as it grows in size and complexity.

As a statically typed language C# is faster than dynamic languages because entities are more clearly defined. So, when the program is running, PC resources will not be wasted checking the definition of something in the code.

C# belongs to the family of languages with C-like syntax, its syntax is closest to C ++ and Java. The language has static typing, supports polymorphism, overload of operators (including operators of explicit and implicit reduction of type), delegates, attributes, events, properties, generalized types and methods, iterators, anonymous functions with support of locks, LINQ, exceptions, comments in a format XML.

Taking much from its predecessors – languages C++, Java, Delphi, Module and Smalltalk – C# based on the practice of their use excludes some models that have proven to be problematic in software development, in particular, C# does not support multiple inheritance classes (unlike C++) or type output (unlike Haskell).

C# was developed as an application-level programming language for the CLR and depends primarily on the capabilities of the CLR itself. This applies primarily to the C# type system which displays BCL. The presence or absence of certain expressive features of the language is dictated by whether a particular language feature can be translated into the appropriate CLR constructs. Thus, with the development of CLR from version 1.1 to 2.0, the C# language itself has been significantly enriched; similar interaction should be expected in the future. However, this pattern was violated with the release of C# 3.0 which is an extension of the language which is not based on the extension of the .NET platform. The CLR provides C#, like all other .NET-oriented languages, many of the

features that «classic» programming languages lack. For example, garbage collection is not implemented in C# itself, but a CLR is developed for programs written in C# in the same way as it is done for programs on VB.NET, J# etc.

Modern software is becoming more complex. Easy-to-use interface, advanced features, program manageability of events, new non-traditional areas of application – all this causes the complexity of the software. Today to build a modern program, it is not enough to simply combine certain machine instructions, high-level language operators, or even sets of procedures and modules. The main issue was to develop a clear structure of the program, suitable for easy modification, error-free and resistant to change [24].

C# – is an object-oriented programming language with a secure typing system for the .NET platform. It was developed by Anders Galesberg and Scott Wiltamutt by Peter Golde under the auspices of Microsoft. The syntax of C# is close to C++ and Java. The language has a strict static typing, supports polymorphism, operator overload, pointers to member functions of classes, attributes, events, properties, exceptions, comments in XML format.

C# was created as a component programming language, and this is one of the main advantages of the language, it is aimed at the ability to reuse the created components.

Among other objective advantages of the C # language we note the following:

- it was created in parallel with the FrameworkNet framework and takes into account all its capabilities such as FCL and CLR;
- is a completely object-oriented language where even the types embedded in the language are represented by classes;
- is a powerful object language with the possibility of inheritance and universalization;
- is the successor of C and C++ languages preserving the best features of these popular programming languages;

- thanks to the Framework.Net framework which has become an add-on to the operating system, C# programmers get the same benefits of working with a virtual machine as Java programmers;
- the efficiency of C# code is even increased because the CLR runtime is an intermediate language compiler, while the virtual Java machine is an interpreter of bytecode;
- powerful library of frameworks supports convenience of construction of various types of applications on C# allowing to build easily Web-services, other types of components, it is simple enough to store and receive information from a database and other data warehouses;
- implementation which combines the construction of reliable and efficient code is an important factor leading to the success of C# [24].

Thus, the C# programming language chosen to build a secure consolidated information resource for analyzing the activities of outsourcing companies in Ukraine which combines the power and flexibility of universal programming languages with high execution code efficiency and the ability to directly access computer hardware, is the best among other languages.

1.6 Designing a secure consolidated information resource for analysis of outsourcing companies' activity in Ukraine

The first step in creating a secure consolidated information resource (SCIR) outsourcing services is to develop its ER-model.

The development of a database on the method of entity–relation consists of the following stages:

- determining of the entities;
- determining of their relations;
- determining of attributes;
- determining of keys of entities;
- determining of the degree of relations;
- determining of affiliation class.

Thus, at the first stage of designing it is necessary to define the entities. The entity is some object representing interest for the user. To solve this problem, it will be advisable to define the following entities:

- COMPANY;
- SERVICE;
- CLIENT;
- EMPLOYEE;
- ORDERS;
- SCOPE OF SERVICES.

At the second stage it is necessary to define relations between entities:

- SERVICE – is – SERVICE DELIVERY;
- CLIENT – carries out – ORDERS;
- ORDER – includes – SERVICE;
- EMPLOYEE – executes – ORDER;
- COMPANY – implements – ORDERS.

At the third stage it is necessary to define attributes (properties) of each entity:

- COMPANY (Company_code, Company_Name, Company_Address, Contacts, Website, Description);
- SERVICE (Service_code, Service_Name, Service_Cost);
- CLIENT (Client_code, Client_Name, Client_Address, Client_Phone);
- EMPLOYEE (Employee_Code, Employee_Name, Employee_Address, Employee_Phone, Position);
- ORDER (Order_code, Service_Code, Company_Code, Employee_Code, Customer_Code, Order_Date);
- SCOPE_OF_SERVICES (Code_of_sphere_providing_services, Name_sphere).

The next, fourth stage – the determination of the keys of entities. An entity key is an attribute or set of attributes that uniquely identifies an instance of an entity. The key to these entities will be:

- COMPANY:

(Company_code, Company_Name, Company_Address, Contacts, Site, Description);

- SERVICE:

(Service_code, Service_Name, Service_Cost);

- CLIENT:

(Customer_code, Client's name, Client_Address, Client_Phone);

- EMPLOYEE:

(Employee_code, Employee_Name, Employee_Address, Employee Phone, Position);

- ORDER:

(Order_code, Service_Code, Company_Code, Employee_Code, Customer_Code, Order_Date);

- SCOPE_OF_SERVICES:

(Code_sphere_of_providing_services, Name_sphere).

The fifth and sixth stages need to determine the degree of relation and the class of affiliation. The degree of relation shows how many direct relations each instance of the entity can have with the instance of the entity to which it is associated. The ER-model for the database of outsourcing companies of Ukraine takes the form shown in Fig. 1.2.

1.7 Normalization of relations in the proposed ER-model

The next stage of designing the database of SCIR of Ukrainian outsourcing companies is the normalization of relations in the proposed ER-model. To carry out this it's necessary to fulfill such steps:

1) to select information objects: COMPANY, SERVICE, CLIENT, EMPLOYEE, ORDER, SCOPE_OF_SERVICES.

2) to identify information that would be useful for SCIR users, for example:

- COMPANY (Company_code, Company_Name, Company_Address, Contacts, Site, Description).

- SERVICE (Service_code, Company_code, Service_name, Service_Cost).
- CLIENT (Client_code, Client_Name, Client_Address, Client_Phone).
- EMPLOYEE (Employee_code, Employee_Name, Employee_Address, Employee_Phone, Position).
- ORDER (Order_code, Service_Code, Company_Code, Employee_Code, Customer_Code, Order_Date).
- SCOPE_OF_SERVICES (Code_of_sphere_providing_services, Name_sphere).

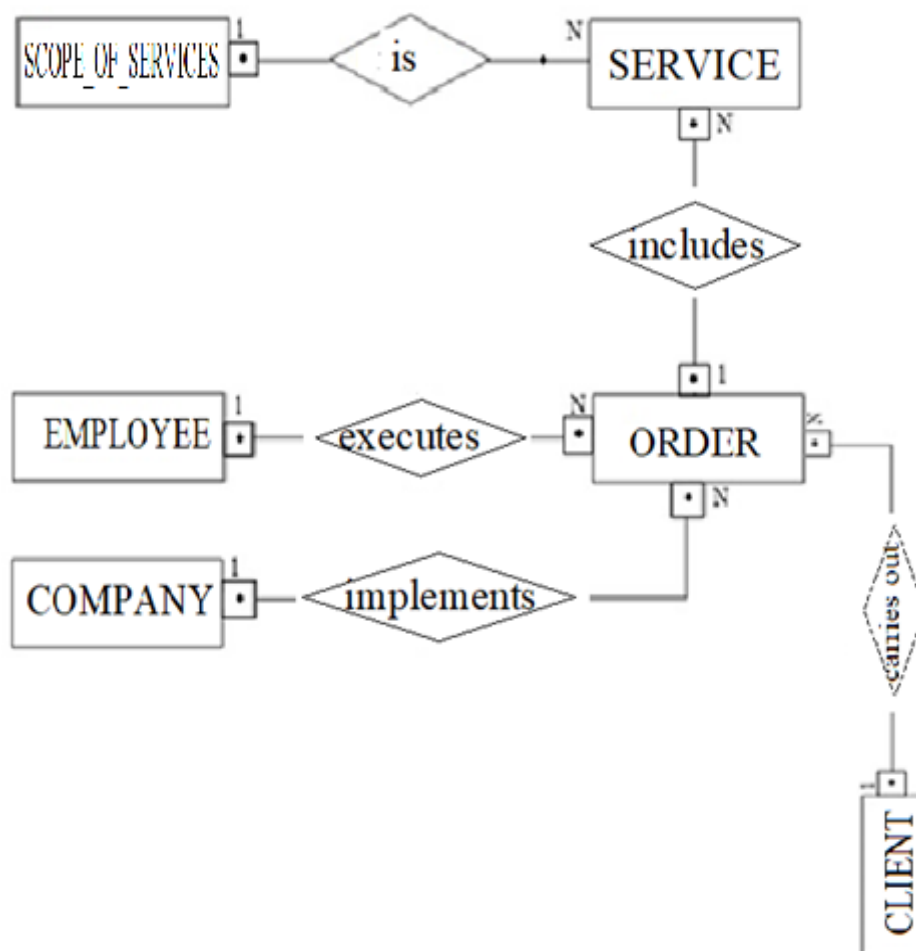


Figure 1.2 – ER-model for the database of outsourcing companies of Ukraine services

3) On the basis of the executed analysis it is necessary to make the universal relation for the given task. To implement this task the universal relation will be such:

R: (Company_code, Company_Name, Company_Address, Contacts, Site, Description, Service_code, Service_name, Service_Cost, Client_code, Client_Name, Client_Address, Client_Phone, Employee_code, Employee_Name, Employee_Address, Employee_Phone, Position, Order_code, Order_Date, Code_of_sphere_providing_services, Name_sphere).

4) If the relation is in the first normal form (1NF), then all non-key attributes are functionally dependent on the key. The primary key for this relationship will be Order_Code.

5) Currently, the relationship is in the first normal form:

R: Order_Code, Company_Code, Company_Name, Company_Address, Contacts, Site, Description, Service_Code, Service_Name, Service_Cost, Client_Code, Client_Name, Client_Address, Client_Phone, Employee_Code, Employee_Name, Employee_Address, Employee_Phone, Position, Order_Date, Code_of_sphere_providing_services, Name_sphere.

6) The relation is in the second normal form (2NF), if it is in 1NF and each non-key attribute is functionally completely dependent on the compound key.

R1: Order_Code, Company_Code, Company_Name, Company_Address, Contacts, Site, Description, Service_Code, Service_Name, Service_Cost, Client_code, Client_Name, Client_Address, Client_Phone, Employee_Code, Employee_Name, Employee_Address, Employee_Phone, Position, Order_Date, Code_of_sphere_providing_services, Name_Sphere.

7) The relation is in the third normal form (3NF), if it is in 2NF and there are no transitive dependences between non-key attributes and the key.

In this case transitive dependence exists in relation:

R2 : Order_Code, Company_Code, Service_Code, Client_Code, Client_Code, Employee_Code, Code_of_sphere_providing_services, Company_Name, Company_ Address, Contacts, Site, Description, Service_name, Service_Cost, Client_Name, Client_Address, Client_Phone, Employee_Name, Employee_Address, Employee_ Phone, Position, Order_Date, Name_sphere.

The relation R1 is in NFBC, but the relation R2 is not in it. Execute decomposition of the relation R2:

R3 : Company_Code, Company_Name, Company_Address, Contacts, Website, Description;

R4 : Order_Code, Company_Code, Service_Code, Client_Code, Employee_ Code, Service_sphere_code, Service_Name, Service_Cost, Client_Name, Client_ Address, Client_Phone, Employee_Name, Employee_Address, Employee_Phone, Position, Order_Date, Name_sphere.

After applying the decomposition method, the following finite relations were obtained:

R1: Company_Code, Company_Name, Company_Address, Contacts, Website, Description;

R3: Service_Code, Company_code, Service_Name, Service_Cost;

R5: Client_Code, Client_Name, Client_Address, Client_Phone;

R6: Employee_Code, Employee_Name, Employee_Address, Employee Phone, Position;

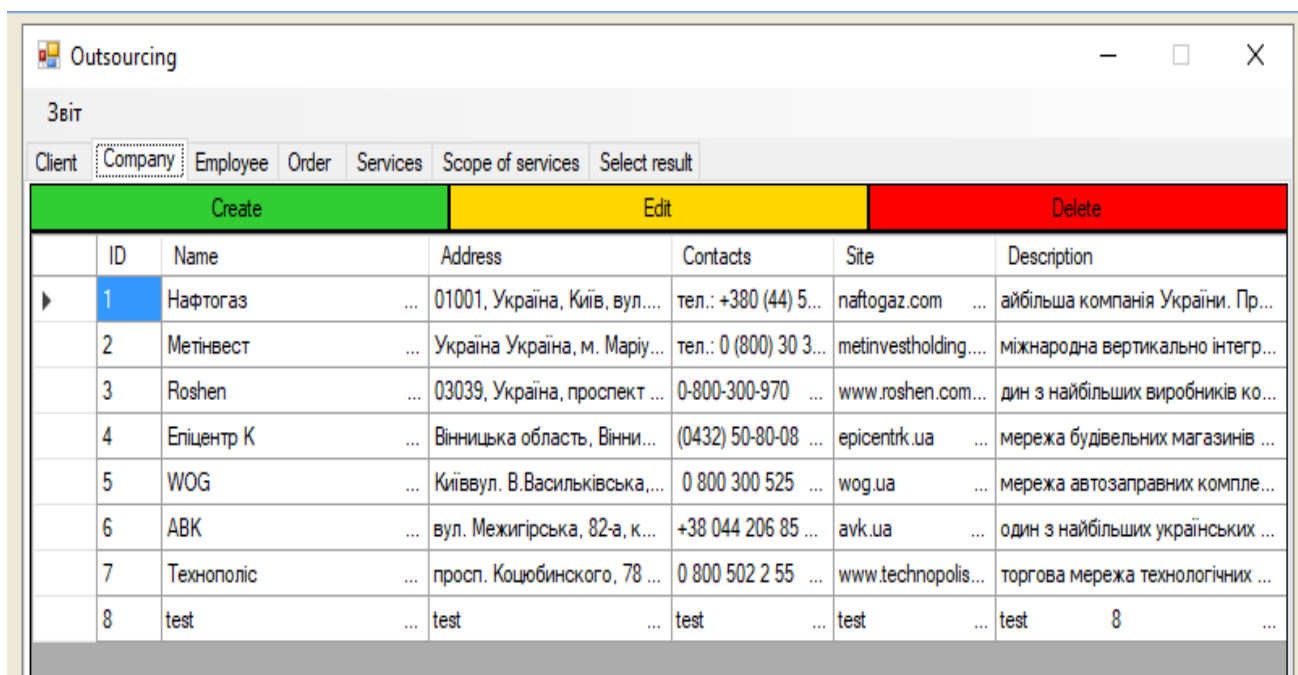
R7: Order_Code, Service_Code, Company_Code, Employee_Code, Client_ Code, Order_Date;

R8: Service_Sphere_Code, Sphere_Name.

1.8 Creation of tables for building the consolidated information resource

The next step is to create tables to build a consolidated information resource. To implement this use the database management system – MySQL.

Consider the following process on the example of a table of the entity «Company» which takes the following form (Fig. 1.3).



Create		Edit		Delete	
ID	Name	Address	Contacts	Site	Description
1	Нафтогаз	01001, Україна, Київ, вул....	тел.: +380 (44) 5...	naftogaz.com	айбільша компанія України. Пр...
2	Метінвест	Україна Україна, м. Маріу...	тел.: 0 (800) 30 3...	metinvestholding....	міжнародна вертикально інтегр...
3	Roshen	03039, Україна, проспект ...	0-800-300-970 ...	www.roshen.com...	дин з найбільших виробників ко...
4	Епіцентр К	Вінницька область, Вінни...	(0432) 50-80-08 ...	epicentrk.ua	мережа будівельних магазинів ...
5	WOG	Київвул. В.Васильківська,...	0 800 300 525 ...	wog.ua	мережа автозаправних компле...
6	АВК	вул. Межигірська, 82-а, к...	+38 044 206 85 ...	avk.ua	один з найбільших українських ...
7	Технополіс	просп. Коцюбинського, 78 ...	0 800 502 2 55 ...	www.technopolis...	торгова мережа технологічних ...
8	test	test	test	test	test 8

Figure 1.3 – Completed table «Company»

To display relationships between tables, you need to create a data schema that displays relationships between database tables. It is presented in Figure 1.4.

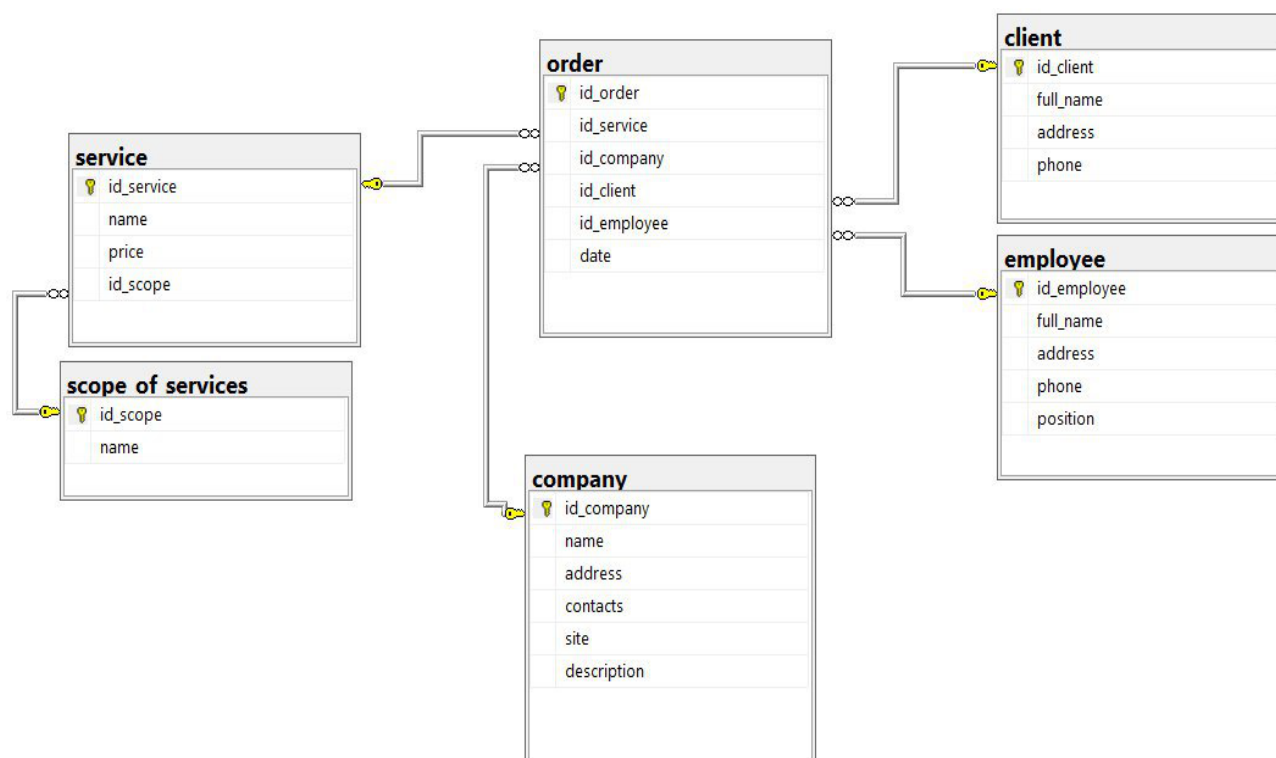


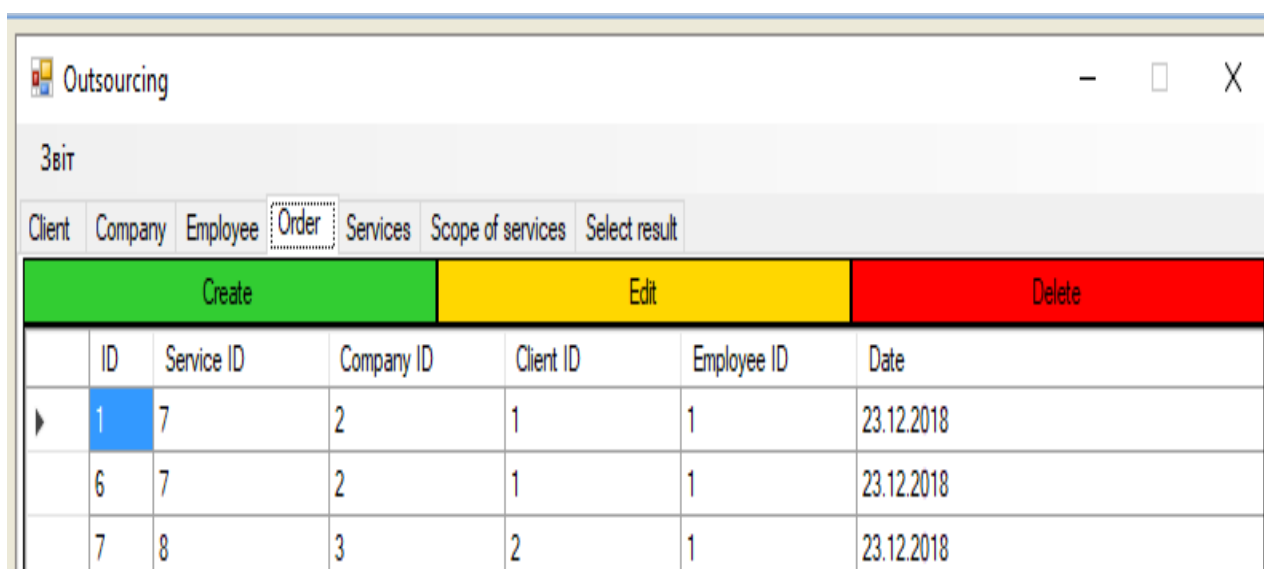
Figure 1.4 – The scheme of relations in created DB

The created tables contain all the necessary data of the object under study, so it will help the user to simplify the analysis of the subject area.

1.9 Creation forms in the consolidated information resource

SCIR for analyzing the activities of outsourcing companies in Ukraine should be presented in a convenient form and display information about clients, companies, orders, services, employees, services, etc. In the database such tasks are implemented using orders forms and reports.

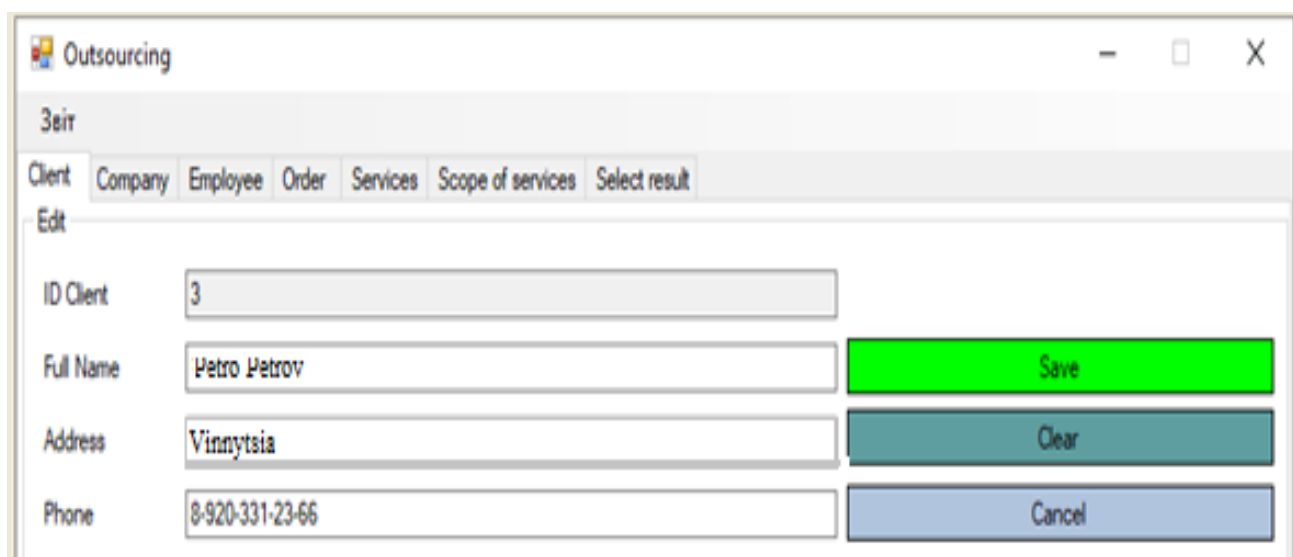
On the «Orders» page (fig. 1.5) the user can create new information by entering the required data in the appropriate fields.



	ID	Service ID	Company ID	Client ID	Employee ID	Date
▶	1	7	2	1	1	23.12.2018
	6	7	2	1	1	23.12.2018
	7	8	3	2	1	23.12.2018

Figure 1.5 – «Order» page

On the «Client» page (fig. 1.6) the user can add new information about the client.



Outsourcing

3air

Client Company Employee Order Services Scope of services Select result

Edit

ID Client: 3

Full Name: Petro Petrov

Address: Vinnytsia

Phone: 8-920-331-23-66

Save

Clear

Cancel

Figure 1.6 – «Client» page

The user also has the ability to information in the database (fig. 1.7).

Outsourcing						
Звіт						
Client	Company	Employee	Order	Services	Scope of services	Select result
Create			Edit		Delete	
ID	Name	Address	Contacts	Site	Description	
1	Нафтогаз	01001, Україна, Київ, вул...	тел.: +380 (44) 5...	naftogaz.com	айбільша компанія України. Пр...	
2	Метінвест	Україна Україна, м. Маріу...	тел.: 0 (800) 30 3...	metinvestholding...	міжнародна вертикально інтегр...	
3	Roshen	03039, Україна, проспект ...	0-800-300-970	www.roshen.com...	дин з найбільших виробників ко...	
4	Епіцентр К	Вінницька область, Вінни...	(0432) 50-80-08	epicentrk.ua	мережа будівельних магазинів ...	
5	WOG	Київвул. В.Васильківська,...	0 800 300 525	wog.ua	мережа автозаправних компле...	
6	ABK	вул. Межигірська, 82-а, к...	+38 044 206 85	avk.ua	один з найбільших українських ...	
7	Технополіс	просп. Коцюбинського, 78	0 800 502 2 55	www.technopolis...	торгова мережа технологічних ...	
8	test	test	test	test	test 8	

Figure 1.7 – Management page of the entered information

1.10 Creation of orders for building the consolidated information resource

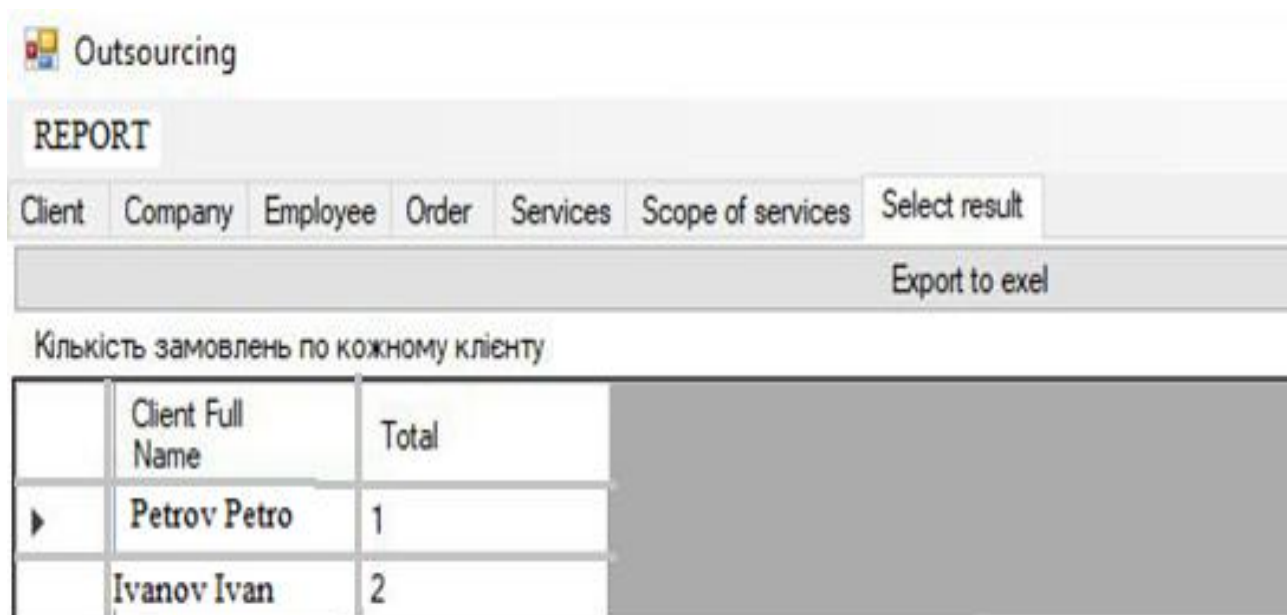
The next step in building of the secure consolidated information resource for analyzing the activities of outsourcing companies in Ukraine is to create orders to build a consolidated information resource. SQL-order consists of four separate parts:

- Data definition language (DDL) is used to determine the structure of data stored in the database. DDL operators can create, edit and delete objects in a database. Acceptable object types depend on the used DBMS and usually include databases, users, tables and a number of smaller support objects such as roles and indexes.

- Data manipulation language (DML) is used to extract and modify data in the database. DML operators allow you to obtain, insert, modify and delete data in tables. Sometimes data deleting operators are not considered part of the DML because they do not change the status of the data. All DML operators are declarative.

- The Data Access Definition Language (DCL) is used to control access to data in the database. DCL operators allow you to give and select rights to use certain DDL and DML operators for certain database objects.
- The Transaction Control Language (TCL) is used to control the processing of database transactions. Typically, operators include a TCL obligation to confirm changes made during the transaction, return them to the cancellation and save point for a joint transaction in several smaller parts.

Below (fig. 1.8) is the SQL order code which shows the ranking of companies by order. The result of the order will be such:

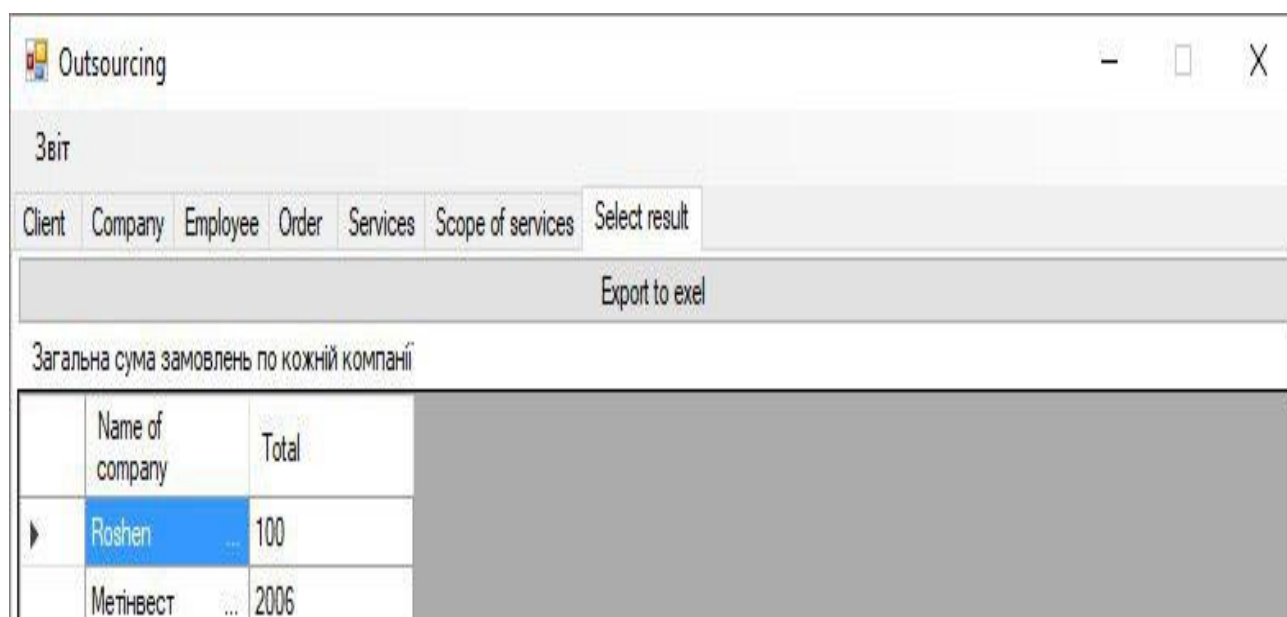


The screenshot shows a web application window titled "Outsourcing". Below the title is a "REPORT" section. There are several tabs: "Client", "Company", "Employee", "Order", "Services", "Scope of services", and "Select result". The "Select result" tab is currently selected. Below the tabs is a button labeled "Export to excel". Underneath the button is the text "Кількість замовлень по кожному клієнту". Below this text is a table with two columns: "Client Full Name" and "Total". The table contains two rows of data: "Petrov Petro" with a total of 1, and "Ivanov Ivan" with a total of 2.

	Client Full Name	Total
▶	Petrov Petro	1
	Ivanov Ivan	2

Fig. 1.8 – Display the rating of companies by order

The request – the total revenue of the company – is presented in fig. 1.9.

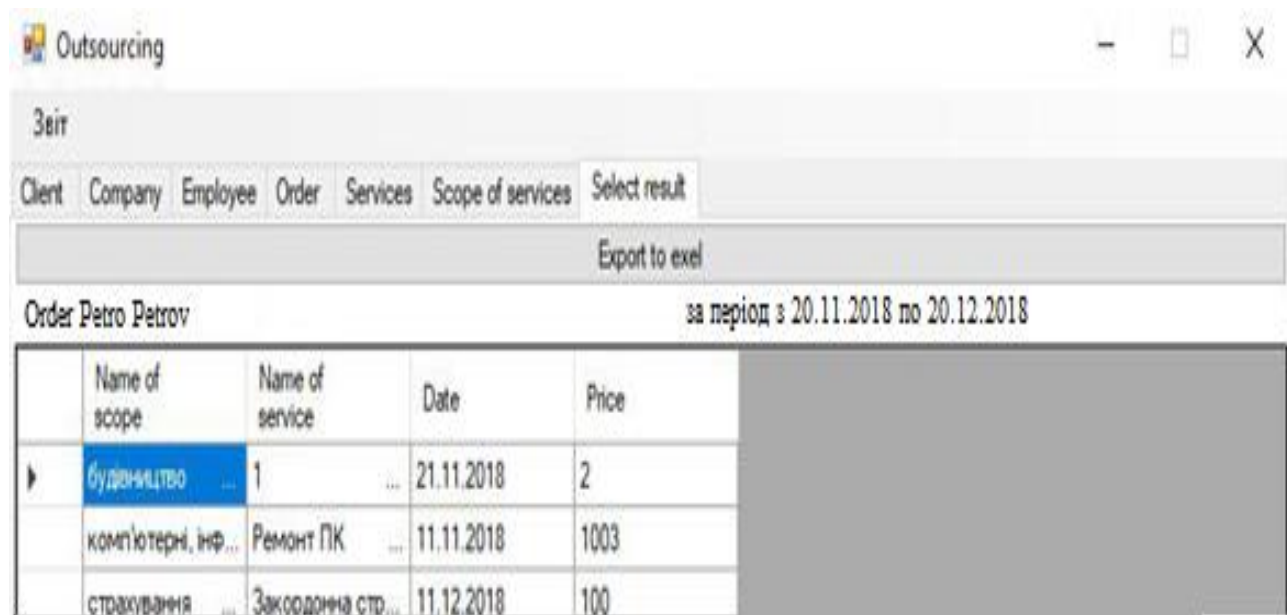


Звіт

Client	Company	Employee	Order	Services	Scope of services	Select result
Export to excel						
Загальна сума замовлень по кожній компанії						
	Name of company		Total			
►	Roshen	...	100			
	Метінвест	...	2006			

Figure 1.9 – Display of total revenue by company

You can also use SQL requests to display all orders created in the company for a certain period of time (Fig. 1.10).



Звіт

Client	Company	Employee	Order	Services	Scope of services	Select result
Export to excel						
Order Petro Petrov за період з 20.11.2018 по 20.12.2018						
	Name of scope	Name of service	Date	Price		
►	будівництво	1	21.11.2018	2		
	комп'ютерні, інф...	Ремонт ПК	11.11.2018	1003		
	страхування	Закоordonна стр...	11.12.2018	100		

Figure 1.10 – Orders created in the company for a certain period of time

The next step in building of the SCIR for analyzing the activities of outsourcing companies in Ukraine is to create reports. The application

should allow the user to generate reports based on these parameters, settings and file processing.

Using the MySQL convergence tools built into dbForge Studio for MySQL by offering dbForge Studio, can execute simple multidimensional data because it can highlight trends and data that allow you to make quick decisions, but based on the provided data summary table.

Key features should include:

- a tool for creating reports and a summary table for MySQL;
- advanced capabilities for creating any reports on the data using the reporting tool for MySQL;
- conversion of string data into meaningful summary tables;
- well-tested functionality.

According to these requirements, reports are designed which accelerate the process of collecting, processing and analyzing information.

The report on the number of orders for each client is shown in fig. 1.11.

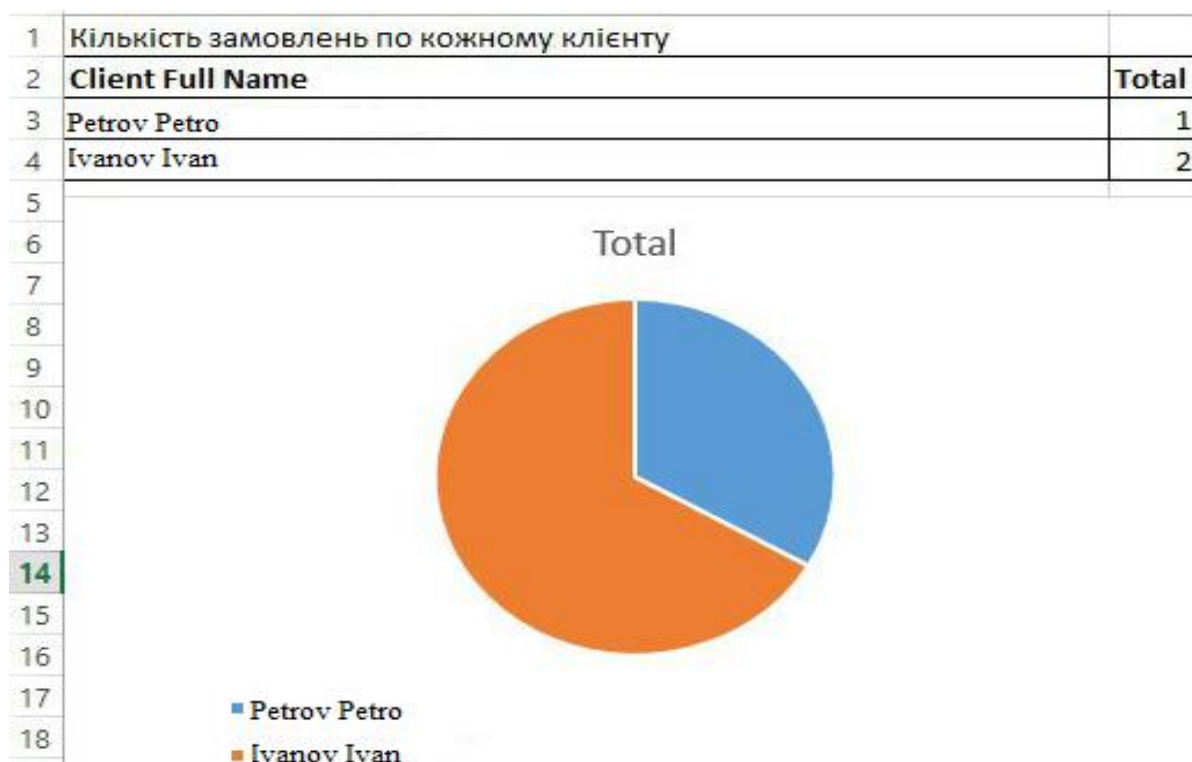


Figure 1.11 – Display of the number of orders for each client

The exported report is presented on the fig. 1.12.

1.11 Secure information technologies of outsourcing company's management

Today's problematic issues in the field of information protection in the processes of outsourcing management need to be resolved both in Ukraine and in the context of its coordination with the information space of the world community. The outsourcing of digital activities creates new channels of interaction with clients, but creates constant mutations of cyber threats and the emergence of new risks and consequently requires the solution of new issues in the system of effective administration. Such systems work on the basis of information systems which are built on the principles of corporate computer networks which determine the heredity of problems specific to corporate structures. They influence both specialists in the field of maintenance in the field of outsourcing and relevant information security services.

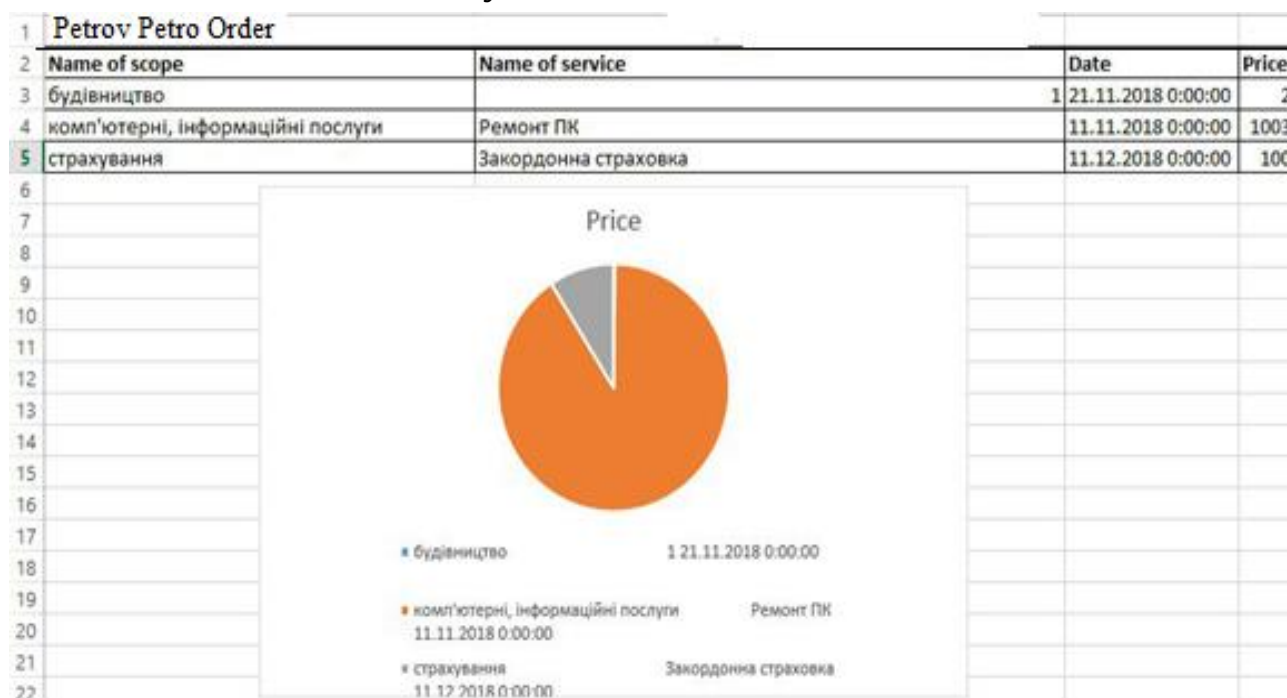


Figure 1.12 – Exported report-order of the client «Petrov Petro»

The main basic aspects that cause such problems are:

- the complexity and diversity of software and hardware used in the outsourcing system used by different operating systems;
- a large number of nodes in the networks that ensure the processes of its life which makes it impossible for timely technical control of the company's activities and security;
- external access to the management system of the outsourcing company is an extremely important problem that arises during its operation;
- functioning of maintenance and information security groups of the outsourcing company which causes the problem of clear delineation of functional responsibilities of the staff of these two groups etc.

The management of an outsourcing company causes the appearance of a significant amount of information and data which mostly differ in format, field of activity, sources. Since this information is important for the company's activities, there is a problem in consolidating its vital information. Thus, when managing an outsourcing company, it is necessary to comprehensively solve complex problems related to its maintenance and information security by developing an appropriate secure consolidated information resource.

Given that consolidated information is obtained from several sources and systematically integrated different types of information resources (knowledge) which together are endowed with signs of completeness, integrity, consistency and constitute an adequate information model of the problem area to process and effectively use in support processes decisions, the process of consolidation was to combine, integrate different types of information. This required the authors to develop a protection mechanism during the creation of an appropriate consolidated information resource based on a database of various information resources which will store and process information from these resources.

Thus, the protection of information in the database created by the authors of the consolidated resource is through the use of MS SQL which is a high-class server that provides management of the developed database, its security and stability and guarantees the highest level of data protection. In addition, SSL certificate is used to protect personal data – a cryptographic protocol that establishes a secure connection between client and server. The protocol creates 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.

Besides, information security in consolidated information resource can be provided in a variety of ways which include modeling the necessary components of security information, namely:

- identification of information sources subject to protection;
- monitoring of the full set of potential threats and information leakage channels;
- analysis of vulnerabilities and risks associated with the collection of information and source channels;
- the selection of means of protective information and their implementation;
- control system protection.

References

1. Azarova A. A., Shiyan A. A., Murza S. P., Kudlyk A. V., Kostyuk T. S. 2019. Development of a protected consolidated information resource analysis of the market for the provision of services by medical laboratories in Ukraine. Bulletin of KhNU. Technical sciences. № 6 (279). pp. 105–109.
2. Azarova A., Shiyan A., Mironova Y., Shturma L. 2019. The development of secured consolidated information resource of activity analysis of the poultry industry in Ukraine. Technology audit and production reserves. № 6/2 (50). pp. 14–18.
3. Azarova A. A., Shiyan A. A., Nikiforova L. O. 2020. Development

of a protected consolidated information resource for the analysis of seaports of Ukraine. Information technology and computer engineering. Vol. 48. № 2. pp. 27–36. DOI: <https://doi.org/10.31649/1999-9941-2020-48-2-27-36>.

4. Azarova A. A., Lyakhovych L. M. 2020. Development of a secure consolidated information resource of e-government. Bulletin of KhNU. Technical sciences. № 3. S. 81–87.

5. Azarova A. O., Tkachuk L. M., Khomyak V. D. 2019. Features of the application of e-government in creating a secure information resource of sports activities. Proceedings of the XLVIII scientific and technical conference of VNTU. URL: <https://conferences.vntu.edu.ua/index.php/all-fm/all-fm-2019/paper/view/7965>.

6. Azarova A. O., Kudlyk A. V. 2020. Prerequisites for the formation of a secure consolidated information resource for the analysis of seaports of Ukraine. Proceedings of the All-Ukrainian scientific-practical Internet conference of students, graduate students and young scientists «Youth in science: research, problems, prospects». URL: <https://conferences.vntu.edu.ua/index.php/mn/mn2020/paper/viewFile/8393/7046>.

7. Azarova A. A., Ivinskaya G. K. 2020. Prerequisites for creating a secure consolidated information resource for analyzing the activities of media business in Ukraine. Proceedings of the All-Ukrainian scientific-practical Internet conference of students, graduate students and young scientists «Youth in science: research, problems, prospects». URL: <https://conferences.vntu.edu.ua/index.php/mn/mn2020/paper/viewFile/8429/7035>.

8. Azarova A. A., Kostyuk T. S. 2020. Secure consolidated information resource for the analysis of the hotel business in Vinnytsia. Proceedings of the All-Ukrainian scientific-practical Internet conference of students, graduate students and young scientists «Youth in science: research, problems, prospects». URL: <https://conferences.vntu.edu.ua/index.php/mn/mn2020/paper/viewFile/8424/7036>.

9. Azarova A. A., Zagoruy L. M. 2020. Protected consolidated information resource for analysis of the poultry industry in Ukraine. Proceedings of the All-Ukrainian scientific-practical Internet conference of students, graduate students and young scientists «Youth in science: research, problems, prospects». URL: <https://conferences.vntu.edu.ua/index.php/mn/mn2020/paper/view/8442/7041> .

10. Azarova A. A., Lyakhovych L. M. 2020. Methodology of creating a protected consolidated information resource of e-government. Proceedings of the All-Ukrainian scientific-practical Internet conference of students, graduate students and young scientists «Youth in science: research, problems, prospects». URL: <https://conferences.vntu.edu.ua/index.php/mn/mn2020/paper/view/10312> .

11. Eliseeva O., Ovsyannikova D. 2021. The impact of the pandemic on the world economy. Proceedings of the IX International Scientific and Practical Conference «Information and analytical support for management decisions on energy and socio-economic problems of Ukraine». pp. 55–57. Octane Print. Prague. ISBN 978-80-88415-19-0.

12. Yeliseyeva O., Ovsyannikova D. 2021. Evaluation of small and medium enterprises of Ukraine in a pandemic. Proceedings of the VI International Scientific and Practical Conference «Strategies and Innovations: Current Management Practices». Kryvyi Rih: Mykhailo Tuhan-Baranovsky Donetsk National University of Economics and Trade. 359 P. pp. 124–127.

13. Yeliseyeva O. K., Repina S. O. 2021. Improving the management of information flows in a pandemic. Collection of materials V International Scientific and Practical Internet Conference «Sustainable Development of the National Economy: Current Issues and Support Mechanisms». Ukraine, Kryvyi Rih. pp. 306–310.

14. Eliseeva O. K., Shevtsova D. S. 2019. Accounting and information support of business in Ukraine. Proceedings of the VII

International Scientific and Practical Conference «Development of Business Analytics, Accounting and Taxation in Globalization, Exacerbation of Energy Problems». Dnipro : LIRA, pp. 55–57.

15. Eliseeva O . K., Tarlopov I. O. 2021. Methodological aspects of assessing the creditworthiness of enterprises. Actual aspects of the development of business entities in the global economy / By general. ed. T. Hryenko: Publisher Bila KO. pp. 277–286 (0.5 d. A. / 0.5 d. A.).

16. Yelisseyeva O. K, Proshkina P. M. 2021. Methodological aspects of estimating the influence of the environmental component on the quality of life of Ukraine population. Bulletin of Khmelnytsky National University. №6. pp. 139–145. URL : <http://journals.khnu.km.ua/vestnik/?cat=57>

17. Kunanets N. E., Pasichnyk V. V. 2013. Introduction to the specialty «Consolidated Information». Lviv: Lviv Polytechnic University. 196 p.

18. Kunanets N. E., Pasichnyk V. V. 2010. Consolidation of information and information security. Information processing systems. Vol. 3. pp. 131–133.

19. Kis Ya. P., Goloshchuk R. O. 2010. Methods of documenting consolidated information: textbook. Lviv : Lviv Polytechnic University. 238 p.

20. Zhezhnych P. I. 2010. Consolidated information resources of databases and knowledge: textbook. Lviv : Lviv Polytechnic University.

21. Matvienko O. V., Tsyvin M. N. Consolidated information: textbook. Kyiv: Center for Educational Literature, 2014. 134 p.

22. Adam F. 2013. ASP.NET MVC 4 with examples in C # 5.0 for professionals. Sankt-Petersburg : Williams. 688 p.

23. Sytnyk N. V. 2004. Design of databases and data warehouses: textbook. K . : KNEU. 348 p.

24. Galiseev G. 2019. System programming. Publisher: University «Ukraine». 113 p. URL: <https://www.yakaboo.ua/en/sistemne-programuvannja.html#tab-attributes>