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Master's Thesis

Design of Information System for Citibank

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DIPLOMA THESIS ASSIGNMENT

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Thesis title

Design of Information System for Citibank

Objectives of thesis

The aim of the diploma thesis work is to design and automate the sales record process for employees of an organization in banking sphere.
In order to reach the goal, the following steps are done.
In the theoretical part the activities of the company and the business process which is required to be automated are analyzed, the design method is chosen and the models that describe the process are created.
In the application part a prototype of the proposed information system is developed in accordance with the models and the economic efficiency of the possible implementation of the information system is calculated.
To sum up, the relevance of this work lies in the developing of several information models of business processes and information system modeling.

Methodology

The methods used in this work include studying, analyzing and evaluating specialized literature sources describing the process of information system creation, developing and designing information models using ARIS and Diagrams applications and proposing a prototype of an information system with the use of HTML, CSS, PHP and SQL.

The proposed extent of the thesis

60 – 80

Keywords

Information Model, Software Design, Prototype, Application, ARIS

Recommended information sources

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Declaration

I declare that I have worked on my master's thesis titled "Design of Information System for Citibank" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 30.03.2023 _____

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Design of Information System for Citibank

Abstract

The diploma thesis work presents a detailed analysis of a company operating in financial and banking sphere – Citibank. The business processes of the customer service group of the organisation were studied in particular.

During the analysis of the enterprise, various information models were built that reflect the activities of both the department and the company as a whole. Subsequently, some disadvantages in the work process of the customer service department were identified. Based on the findings, the task was set to design an information system to eliminate the bottlenecks. Using the ARIS methodology, an organizational structure, “AS-IS” and “TO-BE” models were created describing the chosen business process. Additionally, models showcasing the structure of the proposed information system were built.

As a result of the work, a prototype of an information system was suggested. In order to financially justify the possible implementation of the proposed system, the economic efficiency was calculated.

Eventually, it was concluded that the introduction of the information system would benefit the current business processes of the customer service group of Citibank and the potential implementation of the system is justified for the company.

Keywords: Information System, Model, Business Process, ARIS, Design, Prototype, Software

Návrh informačního systému pro Citibank

Abstrakt

Diplomová práce představuje podrobnou analýzu společnosti působící ve finanční a bankovní sféře – Citibank. Byly studovány procesy oddělení zákaznických služeb organizace.

Při analýze podniku byly vytvořeny různé informační modely, které odrážejí činnost oddělení i společnosti jako celku. Následně byly identifikovány některé nevýhody v pracovním procesu oddělení zákaznických služeb. Na základě zjištěných skutečností byl stanoven úkol navrhnout informační systém k odstranění nedostatků. Pomocí metodiky ARIS byla vytvořena organizační struktura, modely „AS-IS“ a „TO-BE“ popisující zvolený proces. Dále byly vytvořeny modely ukazující strukturu navrhovaného informačního systému.

Výsledkem práce je návrh prototypu informačního systému. Pro finanční zdůvodnění případné implementace navrženého systému byla kalkulována ekonomická efektivita.

Nakonec došlo k závěru, že zavedení informačního systému by prospělo současným procesům oddělení zákaznických služeb Citibank a případná implementace systému je pro společnost oprávněná.

Klíčová slova: Informační Systém, Model, Proces, ARIS, Design, Prototyp, Software

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ARIS	Architecture of Integrated Information Systems
CB	Commercial Bank
DB	Database
DBMS	Database Management System
EPC	Event-driven Process Chain
IS	Information System
PI	Profitability Index
SQL	Structured Query Language
UB	Universal Banker

1. Introduction

In the modern world the effective use of new information technologies is becoming increasingly important. The informatization process has affected almost all economic sectors. The improvement of information technologies and adaptation to modern conditions became possible due to the massive use of the latest computer and telecommunications technologies [2].

The development of the economy directly depends on the state of the banking system, financing, and servicing of enterprises by commercial banks. The necessary prerequisite for this is to ensure the stability of the banks themselves [33].

Commercial banks provide comprehensive customer service – accumulation (attraction) of funds in deposits, their placement (investment function), settlement and cash services, and the provision of other banking services. The main parameters that determine the performance of a commercial bank are the speed and quality of service, the level of reliability, bank reserves, the volume of services [10].

The diploma thesis work examines the activities of the divisions of CB Citibank and the organization as a whole. The main emphasis is made on the analysis of the work of the Bashkortostan branch of the company.

Company analysis includes:

1. study of the company, its organizational and functional structures;
2. description of existing business processes that directly affect the efficiency of the enterprise;
3. identification of business processes that have so-called "bottlenecks" – duplicate operations or work, time delays, information loops or overloads of individual elements;
4. selection of a business process for automation;
5. creating appropriate models in order to obtain a visual representation of the company.

The analysis revealed the need to design and create a prototype of an information system for sales recording of banking products which will optimize the functioning of the customer service group of the Bashkortostan branch of CB Citibank.

The purpose of the diploma thesis work is to automate the process of recording of sales of employees of the customer service group of Citibank.

The diploma thesis work includes the following steps to be performed:

1. to analyse the activities of the company and the selected process;
2. to choose a design method and build models that describe the automated business process, the proposed information system;
3. to develop a prototype of an information system in accordance with the built models;
4. to calculate the economic efficiency of the information system implementation.

Thus, the relevance of this work lies in the need to develop a prototype of an information system that can provide high-quality support for the activities of Citibank in terms of improving the efficiency of employees, as well as recording of sales of both an individual employee and the bank branch as a whole.

2. Objectives and Methodology

2.1 Objectives

The aim of the diploma thesis work is to design and automate the sales record process for employees of an organization in banking sphere.

In order to reach the goal, the following steps are done.

In the theoretical part the activities of the company and the business process, which is required to be automated are analysed, the design method is chosen and the models that describe the process are created.

In the application part a prototype of the proposed information system is developed in accordance with the models and the economic efficiency of the possible implementation of the information system is calculated.

To sum up, the relevance of this work lies in the developing of several information models of business processes and information system modelling.

2.2 Methodology

The methods used in this work include studying, analysing, and evaluating specialized literature sources describing the process of information system creation, developing and designing information models using ARIS methodology, ERwin Data Modeler application and proposing a prototype of an information system with the use of HTML, CSS, PHP and SQL.

The work sequence proceeds as follows. First the introduction was done, providing general information on the diploma thesis and work sequence. The next section is the theoretical part with characteristics of the subject area and research of software and design solutions. In this part the introduction to the company at focus, CB Citibank, is made. Various models describing the organization are created and listed. During this step a business process with potential bottleneck is identified. After that the practical part is introduced describing the steps that happened to provide comprehensive models of the enterprise workflows and suggestions to improve the existing business process defined in the previous step. Models are designed to show the process in the current state which follows with a model showing the same process in a modified view. After analyzing the models, a decision was made to suggest a prototype of an information system that provides automation solution for the chosen business process. To provide the justification to develop the information

system an economic evaluation is done with the help of investments analysis, calculating several indicators (NPV, PI, DPBP) that show profitability of implementing the solution. Designed models include organizational chart, products and services tree, functions tree diagram, EPC diagram, information model showing data flows in the proposed information system, dialogue scenario, tree of program modules and block diagram of system software modules. After completion of the above-mentioned steps, the work is summed up in the results and discussion section together with conclusion.

3. Theoretical Part

3.1 Information systems

The economics of enterprises associated with the operation of computer technology and software are influenced by several factors. The first is related to dynamic changes in the environment of users of products and services. Under the new conditions, users treat funds sparingly and try to use the services of computer centers rationally. The second is the massive use of personal computers, which significantly changed the structure of the hardware and software spheres. The third is a change in the form of ownership of enterprises, thereby changing the situation on the market. The fourth is the emerging and developing market for software products and services, the emergence of competition between manufacturers [43].

Information system – a system designed to collect, store, search and process information, and related organizational resources that provide and distribute information [57].

There are several types of information systems:

1. Management Information System.

By automating several tasks that were previously done manually, the management information system helps to process such workflows as measuring and analyzing business performance, making choices, creating a business plan, and establishing processes. By examining the roles and duties, it also gives managers feedback [34].

In this work the goal is to suggest a prototype of a management information system.

The following are a few benefits of this kind of information systems:

- increases the business's productivity and efficiency;
- gives a precise picture of the performance of the organization;
- improves product development, introduces innovation, and adds value to already existing items;
- facilitates business process planning and communication;
- enables the company to offer a competitive advantage.

2. Decision Support System.

This type of system provides automation in decision-making or problem-solving processes. A decision support system is an information system that analyzes business data and other information relevant to the firm. When difficulties arise while running the business, management employs it. The decision support system is typically used to gather data on revenue, sales, or inventory. It is a well-known information system type that is utilized in a variety of businesses [23].

3. Knowledge Work System.

An organization can use a variety of knowledge management systems to guarantee a constant flow of fresh and updated knowledge into the business and its processes. One of the knowledge management tools that makes it simpler to incorporate fresh data or knowledge into operational procedures is the knowledge work system (KWS).

Moreover, these systems provide assistance and resources for various knowledge generation methods, AI software, and group collaboration platforms for information sharing, among other things. Additionally, it employs images, pictures, etc. to communicate up-to-date information [53]. The applications that utilize KWS's main principles are listed below:

- computer-aided design (CAD) systems are frequently used by designers to automate their design process;
- with the aid of cutting-edge technologies, financial workstations are used to evaluate vast volumes of financial data;
- systems for presenting data utilizing graphics and other platforms can be found in the scientific, educational, and business domains employing virtual reality.

4. Office Automation System.

An information system known as an office automation system controls a variety of administrative tasks, including documentation, data recording, and office transactions, among others. Administrative tasks are separated from managerial tasks in the office automation system. These are some examples of business operations carried out using this kind of information system: word processing, email, and voice mail [37].

5. Transaction Processing System.

The process of collecting, modifying, and retrieving transactions is automated by the transaction processing system. This type of information system's particular

characteristic is that it improves the efficiency, dependability, and consistency of commercial transactions. It facilitates hassle-free daily operations for enterprises.

6. Executive Support System.

Top-level executives can plan and manage their workflow and make business choices with the aid of an executive support system, or ESS. It highly resembles the management information system [53].

There are some of ESS's distinctive qualities:

- offers excellent communication, useful display options;
- may access information through static reports, graphs, and on-demand textual content;
- among other things, it aids in performance monitoring, rival strategy tracking, and trend forecasting.

Below are listed the business operations where an information system can be included.

1. Enterprise resource planning (ERP)

Business administration and planning processes can be automated with the aid of information systems.

2. Supply chain management (SCM)

Information systems give supply chain management participants a single platform to communicate. Additionally, it facilitates efficient communication between parties.

3. Customer relationship management (CRM)

Numerous information systems aid in fulfilling client needs. Other information applications also make it simple and hassle-free for businesses to communicate with their customers [18].

The main functions of an information system are generally searching, processing and storage of information [47].

The specific tasks that must be solved by the information system depend on the application area for which the system is intended. Often, they are used to automate various business processes of a company. At its core, a business process is a repeatable collection of steps a company uses to accomplish a goal.

The purpose of a business process is to help a company reach a specific target. If there is a business goal to be accomplished, processes provide the possibility to take repeatable, consistent steps forward [55].

3.2 Design solutions

3.2.1 Overview of existing tools

Today, a large number of technologies for designing organizational and technical systems are offered.

There are also a number of tools specialized for automating the design process.

Among the most popular ones are ARIS Toolset, Enterprise Architect, Bpwin.

ARIS Toolset is a methodology and software product for modeling business processes of organizations, developed by the German company Software AG. ARIS assumes a certain approach to the formalization of information about the activities of the organization and its presentation in the form of graphical models. ARIS models can be used to analyze and develop various kinds of decisions on the reorganization of an enterprise, including the implementation of ERP systems, the development of quality management systems. To describe business processes, it is proposed to use about 80 types of models, each of which belongs to one or another aspect. ARIS has powerful representational graphics, making the models particularly suitable for presentation to management [14].

Enterprise Architect is a software product created by Sparx Systems. The solution is a powerful and flexible visual modeling tool that supports the full life cycle of creating software systems using a unified modeling language [51].

BPwin – developed by ltd. Logic Works and is designed to support the process of creating information systems. This product is a functional modeling tool that uses the IDEF0-IDEF3 methodology [16].

Table 1 shows a comparative description of the suggested software tools.

Table 1: Software solutions (Source: [author])

Name	ARIS	Enterprise Architect	BPwin
Ensuring the integrity of the project and monitoring of its status	Yes	Yes	No
Platform and DBMS independence	Yes	Yes	Yes
Simulation modeling	Yes	No	No
Easy to use without special training	Yes	No	Yes

Based on the results of the overview, it was concluded that ARIS Toolset from Software AG is suitable for the purposes set in the work.

3.2.2 Architecture of integrated information systems

Software AG developed ARIS (Architecture of Integrated Information Systems), a software package as well as methodology for structural modelling of various enterprises. The tool allows to formalize information about an organization's activities and show them in information models [1].

The ARIS concept aims to ensure that an enterprise information system can completely meet its requirements.

This framework is based on a division of the model into description views and levels, which allows a description of the individual elements through specially designed methods, without having to include the entire model. The methodology serves as a systems development life cycle for mapping and optimizing business processes. These processes are mapped for each description view, starting with the business management question up to the implementation on data processing level.

ARIS relies mainly on its own five-view architecture – ARIS house (Figure 1). These five views are the organizational, data, service, functional and process views of a process. The classification is made to break down the complexity of the model into five facets and thus make business process modelling simpler [48].

Each view of the ARIS concept represents the model of a business process under a specific aspect:

- Function view: the activities and the groupings and hierarchical relationships that exist between them are described in the function view, for example in a function tree. Since functions support goals and are controlled by them, goals are also assigned to the function view:
- Organization view: it provides an overview of the organizational structure of a company, including human resources, machines, hardware, and their relationships, see also Organizational chart;
- Data view: all events (that generate data) and environmental data, such as correspondence, documents, etc., i.e. all company-relevant information objects, see also Entity Relationship Model;
- Product/Service view: provides an overview of the entire product/service portfolio (incl. services, products, financial) ;
- Process view: the process view connects all other views into a time-logical schedule, for example in an event-driven process chain or BPMN.

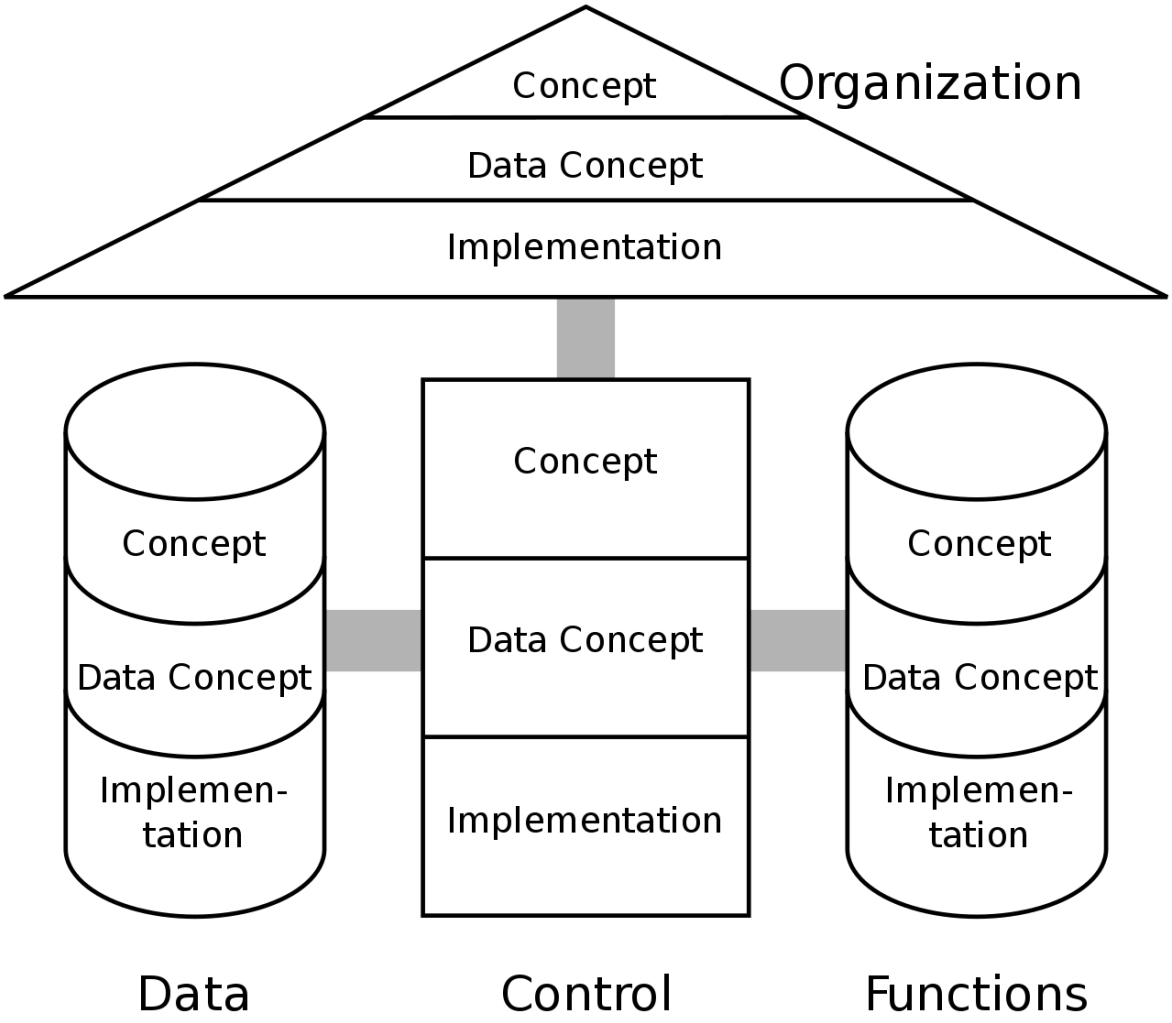

Figure 1: Model of the ARIS Framework (Source: [1])

Advantages of the ARIS methodology:

1. the ability to view an object from different points of view. Different levels of description, providing support for the concept of the life cycle of systems;
2. a differentiated view of the analysed object;
3. a wealth of modelling methods that reflect various aspects of the subject area under study, allows you to model a wide range of systems;
4. a single repository. All models and objects are created and stored in a single project database, which ensures the construction of an integrated and complete model of the subject area;
5. the possibility of multiple application of the simulation results.

Description levels

Each description view of the ARIS house is divided into three description levels:

Concept

Structured representation of the business processes by means of description models that are understandable for the business side (depending on the view, e.g.: ERM, EPC, organization chart, function tree)

Data Concept (= data processing concept, IT concept)

Implementation of the technical concept in IT-related description models (depending on the view e.g. relations, structure charts, topologies)

Implementation

IT-technical realization of the described process parts (depending on the view, e.g. by creating program code, database systems, use of protocols)

Dissemination and related work

The ARIS concept forms the basis of various software products, such as the ARIS Toolset from Software AG, which has been the owner of ARIS trademarks since IDS Scheer AG was acquired. At the end of 2004, part of the concept was reflected in the graphical process integration of SAP Exchange Infrastructure.

ARIS is a very well-known approach for the description of information system architectures, especially in German-speaking countries. As a concept of the Management Frameworks group, however, it is one of over fifty existing frameworks for information management on the market. The architecture of interoperable information systems (AIOS) was also published in 2010 at the Institut für Wirtschaftsinformatik (Institute for Information Systems) in Saarbrücken, which was founded by Scheer. While ARIS describes company-internal information systems and business processes, AIOS describes how cross-company business processes can be realized by adapting and loosely coupling information systems [14].

With the "Model-to-Execute" approach, business processes can be modelled in ARIS and automatically transferred to web Methods BPM for technical execution.

Applications

As one of the Enterprise Modelling methods, ARIS provides four different aspects of applications:

The ARIS concept:

- is the architecture for describing business processes;
- provides modelling methods, the meta structures of which are comprised in information models;

- is the foundation for the ARIS Toolset software system for the support of modelling.

The ARIS house of Business Engineering (HOBE) represents a concept for comprehensive computer-aided Business Process Management.

3.2.3 Data modelling solution

ERwin Data Modeler (written as erwin or ERwin) is software for data modelling. Originally developed by Logic Works, ERwin has since been acquired by a series of companies, before being spun-off by the private equity firm Parallax Capital Partners, which acquired and incorporated it as a separate entity, ERwin, Inc., managed by CEO Adam Famularo [21].

The software's engine is based on the IDEF1X method, although it now also supports diagrams displayed with a variant information technology engineering notation, as well as a dimensional modelling notation.

At its core, erwin has a computer-aided software engineering tool (or CASE tool). Users can utilize erwin Data Modeler as a way to take conceptual data model and create a logical data model that is not dependent on a specific database technology. This schematic model can be used to create the physical data model. Users can then forward engineer the data definition language required to instantiate the schema for a range of database-management systems. The software includes features to graphically modify the model, including dialog boxes for specifying the number of entity–relationships, database constraints, indexes, and data uniqueness. ERwin supports three data modeling languages: IDEF1X, a variant of information technology engineering developed by James Martin, and a form of dimensional modeling notation [21].

The software also allows users to generate data models by reverse-engineering pre-existing databases that are based on several different formats. Another included feature is erwin's ability to create reusable design standards: "including naming standards, data type standards, model templates and more." The software includes several features for modifying how the data model is displayed, including options for several colors, fonts, diagrams, subject areas and layouts.

ERwin's Complete Compare feature allows the user to compare two versions of a model, displays differences, and allows for merging and updates in either direction. As of March 2016, the software bundle also includes its own Report Designer. The ERwin DM

2018 update included Netezza, MySQL 8.x, PostgreSQL 10.4, and Hive; model counts reports; and PII support. The 2019 update included DB2 z/OS v12, SQL Server 2017, Teradata v16.20, and PostgreSQL 11.2, in addition to reporting enhancements like user-defined properties and filters.

3.2.4 Diagrams overview

The diagrams created in this work include the following:

1. Organizational diagram – an organizational chart displays a company's or organization's internal structure. To understand the internal structure of the enterprise, it is necessary to consider creating its organizational structure [15].
2. Products and Services Tree diagram – the model is used to describe the products and services produced in the company, as well as the connection with the strategic goals of the company, business processes.
3. Functions Tree diagram – a hierarchical model of the types of enterprise activities. Any management task can be represented in the form of a business function tree.
4. EPC diagram – an event-driven process chain is a notation for describing business processes as a sequence of events and functions. For each function, initial and final events, participants, performers, material, and information flows accompanying it can be determined, and decomposition into lower levels can be carried out. In general terms, the finished scheme in EPC notation looks like a sequence of events and functions, detailed to the objects used and participants in the process [48].
5. Information Model (Database Model) – the information model is designed to describe the information flows of the IS. The information model reflects the composition and methods of obtaining the initial information [35].
6. Information System functions diagram – the use of these schemes allows to visually show the hierarchy of control functions and data processing processes that are automated in the developed system.
7. Dialogue Scenario Diagram – the dialog script is a graphical representation of the relationship of dialog boxes issued by the program to the user and displays the interactive mode of the program. The scenario is a composition of functions and their hierarchy in the system.

8. Tree of program modules and Block diagram of system software modules – Algorithm diagram (flowchart) is a graphical representation of a program or algorithm using standard graphic elements denoting commands, actions, data, etc. [45].

3.3 Characteristics of the subject area

3.3.1 Description of the organisation

Citigroup Inc. or Citi is an American multinational investment bank and financial services corporation headquartered in New York City. The company was formed by the merger of banking giant Citicorp and financial conglomerate Travelers Group in 1998; Travelers was subsequently spun off from the company in 2002. Citigroup owns Citicorp, the holding company for Citibank, as well as several international subsidiaries. Citigroup is incorporated in Delaware [12].

Citigroup is one of the largest banking institutions of the United States; alongside with JPMorgan Chase, Bank of America, and Wells Fargo, it is one of the Big Four banking institutions of the United States. It is considered a systemically important bank by the Financial Stability Board and is commonly cited as being too big to fail. It is one of the nine global investment banks in the Bulge Bracket.

Citigroup is ranked 33rd on the Fortune 500 as of 2021. Citigroup has over 200 million customer accounts and does business in more than 160 countries. It has 204,000 employees, although it had 357,000 employees before the financial crisis of 2007–2008, when it was bailed out by a massive stimulus package from the U.S. government.

The bank has 22 branches in 10 Russian cities, over 600,000 private and 3,000 corporate clients, and more than 3,000 employees.

On October 1, 1992, Citi opened a representative office in Moscow, and on November 1, 1993, the company received a license to conduct banking activities in Russia, becoming one of the first international banks to enter the Russian market. In January 1994, Citi inaugurated its office in Russia and focused its activities on corporate business, financing and trading on the stock exchanges.

Citi's mission is to be a trusted partner for clients, providing them with responsible financial services that contribute to sustainable development and economic progress [12].

The main activities of the Bank are the attraction of deposits, the provision of loans, the conduct of operations with foreign currency and securities. These types of transactions

are carried out by the Bank's Head Office located in Moscow, as well as by the Bank's branch in St. Petersburg. The Bank also has branches in the cities of Samara, Rostov-on-Don, Yekaterinburg, Nizhny Novgorod, Volgograd, and Ufa, where banking services are provided to individuals. The Ufa city branch is called “Bashkortostan” taking the name of the region it is located in. The activity of the bank is regulated by the Central Bank of the Russian Federation. The Bashkortostan branch is the main point of interest and study as the author of this paper had a chance to work in this exact office of the bank during an internship. Working experience in this branch provided significant insights into the vast number of different workflows of the company.

To understand the internal structure of the enterprise, it is necessary to consider its organizational structure.

The organizational structure of Citibank is shown in Figure 2. The model was created using ARIS software.

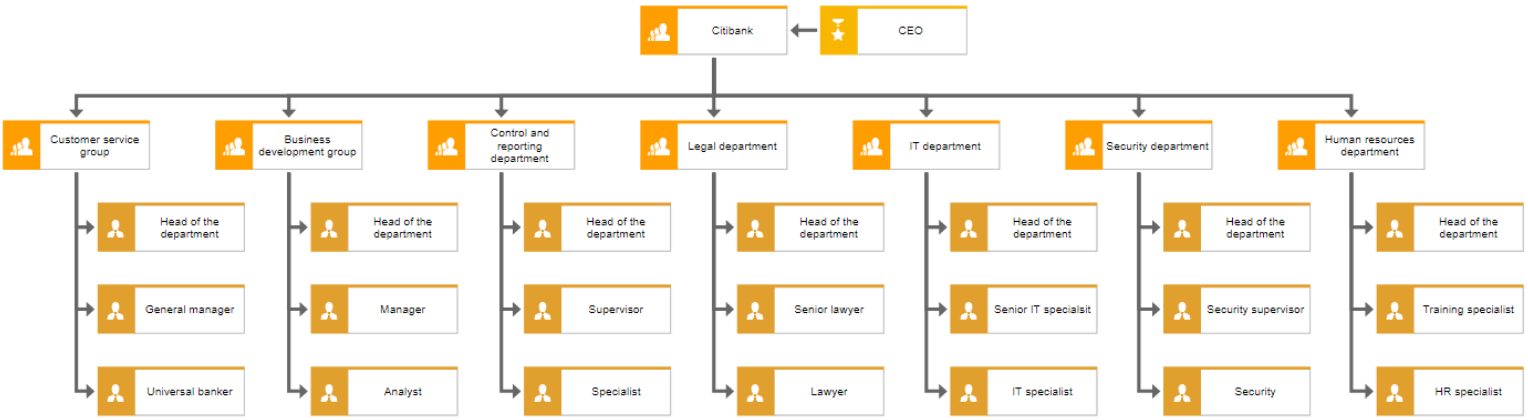

Figure 2: Organizational structure (Source: [author])

It can be seen from the above structure that Citibank is a large organization, with many departments and subdivisions performing various functions to support the company's activities. In this paper, the bank's customer service group is considered in detail.

3.3.2 Description of the unit and its activities

Figure 3 shows the "Products and Services Tree" model, which is used to describe the products and services produced in the company, as well as the connection with the company's strategic goals, business processes [35].

The customer service group is directly responsible for the delivery of these products to customers, with the subsequent provision of a full range of services offered within these banking products.

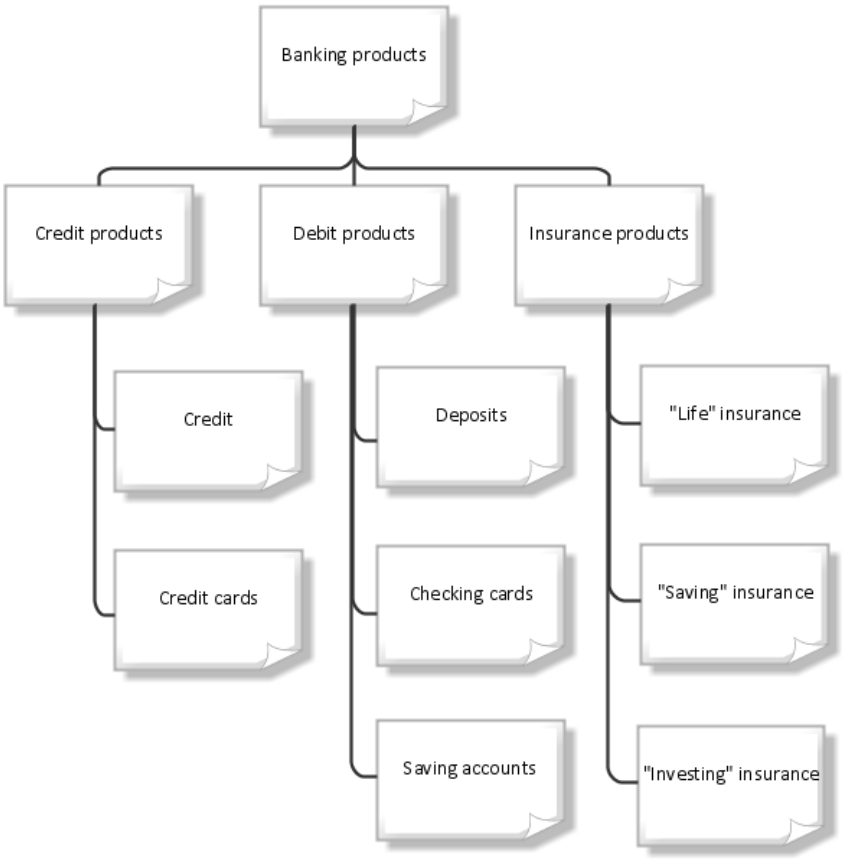

Figure 3: Products and Services Tree (Source: [author])

As can be seen from the diagram, Citibank provides a wide range of banking products.

As a result of the work, it is planned to automate the activities of the customer service group of the Bashkortostan branch of Citibank, which is located in Ufa, Russia.

Function Tree – a hierarchical model of the types of enterprise activities that ensure the achievement of the company's goals. Any management task can be represented in the form of a business function tree [29].

The function tree of the customer service group is shown in Figure 4.

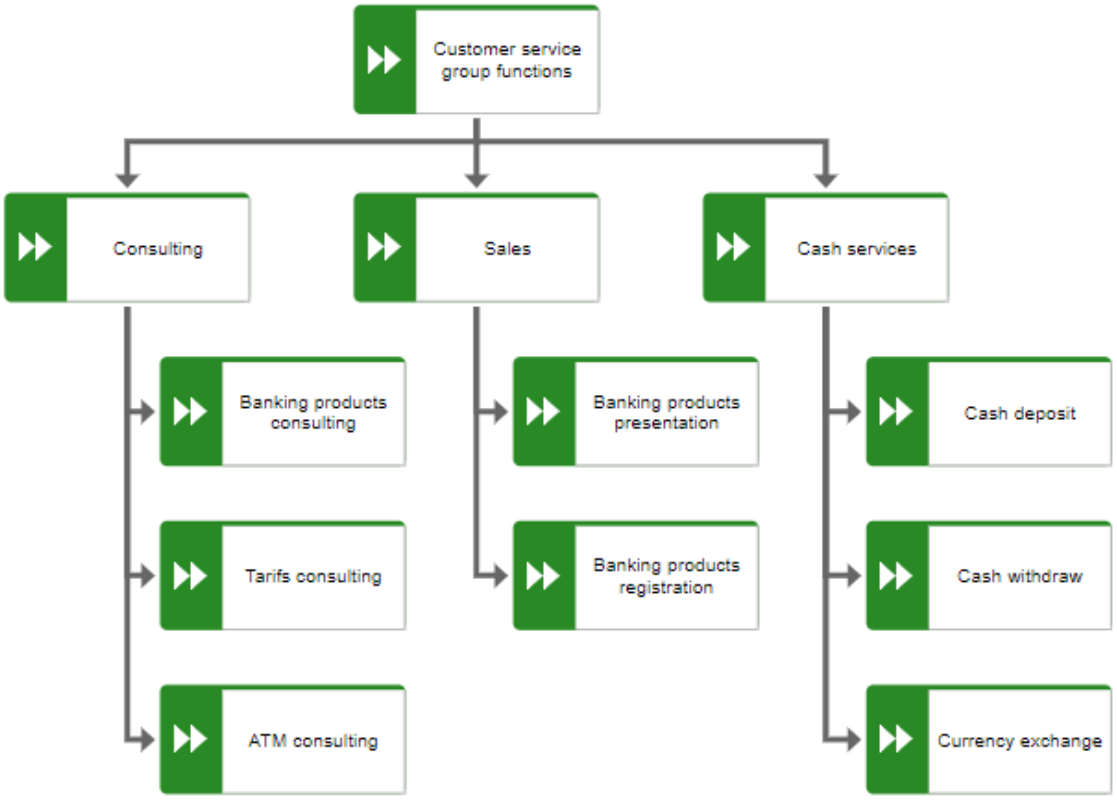

Figure 4: Function Tree (Source: [author])

The customer service group is one of the main divisions of the bank, performing various operations, interacting with customers.

Tasks of the customer service group:

1. clients consulting;
2. deposits and cash services;
3. currency exchange;
4. sales of banking products/services;
5. opening, maintaining and closing of banking accounts;
6. issue of bank statements and supporting documents;
7. assistance to customers in the ATM area.

3.3.3 Economic perspective

The speed and quality of work of employees directly affects the performance of the organization as a whole. In order to increase the productivity of employees, companies are

taking various measures to improve working conditions by introducing certain solutions that simplify daily operational activities [37].

It is important to minimize various distractions and automate processes whenever possible. At the same time, it is necessary to correctly evaluate the work of an individual employee taken over a period of time in order to provide an adequate assessment of his activities. For successful work, bonuses can be given, and in case of any difficulties, additional training sessions can be held.

At Citibank, the position of an employee who interacts directly with customers is called “universal banker”. Further, the abbreviation UB is used to refer to the universal banker employee. The staff of the Bashkortostan branch has 5 employees of UB.

Today, in Citi, the process of assessing the performance of employees does not have a clear structure and, as a result, is not automated. The responsibility for monitoring UB performance lies with the department manager. However, records of meetings held with clients, the number of clients served, and sales are kept by the UB employee in any form (using MS Office or on paper). Data about the activities of the employee is collected and transferred to the manager. At the same time, information can be transmitted both in parts of the day, and after the bank closes in the evening. There is no clear schedule for the information provided, the data does not have a specific structure.

Obviously, such an approach to monitoring the activities of employees is labor-intensive and not optimized. In this regard, the need for the introduction of an additional economic information system in order to automate this process has been identified.

Figure 5 shows the considered business process in EPC notation.

An event-driven process chain (EPC diagram) is a notation for describing business processes as a sequence of events and functions. For each function, initial and final events, participants, performers, material and information flows accompanying it can be determined, and decomposition into lower levels can be carried out. In general, the finished scheme in the EPC notation looks like a sequence of events and functions, detailed to the objects used and process participants [32].

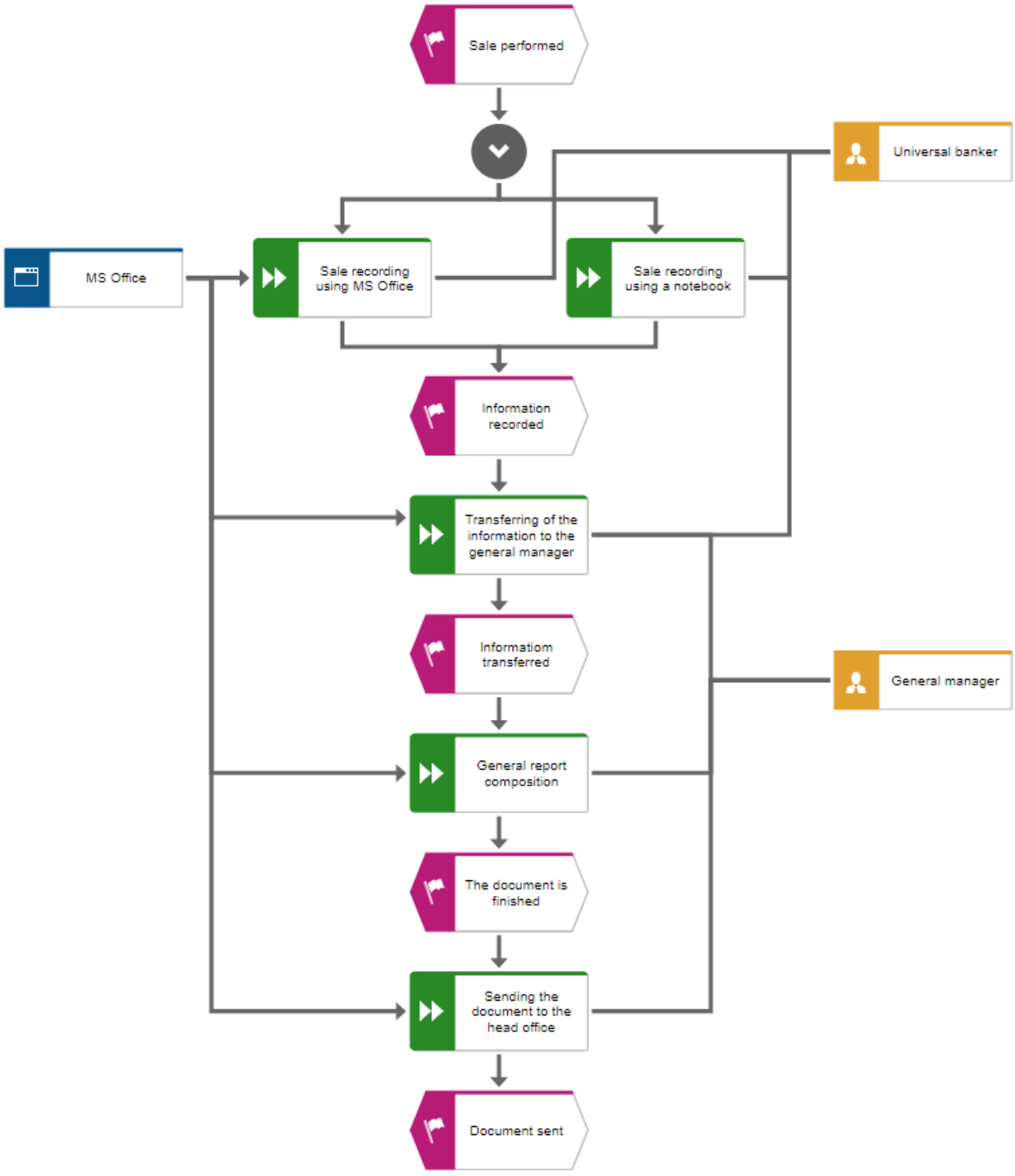

Figure 5: EPC Model "AS-IS" (Source: [author])

After meeting with the client and providing the banking product (process of sale), the UB employee records information about the sale in an Excel sheet, a Word document, or on paper. The information is not structured, sometimes important details of the sale are missed. Further, the list of sales is transferred to the manager. The manager collects such

lists from each employee at the end of the working day and forms a general sales document for the department. This document is sent to the head office of the bank as a part of the general reporting of the branch.

In the process of data collection, a lack of information is often revealed. Also, in its current form, this process requires an unreasonably long time. There are actions that are not necessary. For example, the manager must collect sales lists from each UB employee on a daily basis, structure and form a general document with his own hands, reflecting the total sales of the department.

It follows from the above that this process needs to be optimized.

3.3.4 Existing information systems

A large number of clients, as well as a wide range of services provided, require significant organizational costs for Citibank. Competent automation and digitalization of the company's activities as a whole or an individual subdivision will reduce these costs to minimum and eventually make banking services more convenient for the client.

Nowadays there are some solutions (corporate information system "Eclipse", a website on the Internet) that help automate the activities of the bank. However, these solutions do not fully meet the emerging requirements. The internal corporate information system "Eclipse" is a database and a DBMS containing contact information of clients, information about accounts. The bank's website is unified for all regions and serves informative functions. It also allows to perform a limited list of operations in the client's personal account, including viewing account information and making bank transfers.

It follows from the above that there are no solutions for organizing the employee sales recording process.

In this regard, a decision was made to develop a prototype of an additional information system to support Citibank's activities.

3.3.5 Functionality requirements

This work represents the development of a prototype of an information system for sales recording process of UB employees in the Bashkortostan branch of Citibank.

The purpose of creating an information system:

- introduction of an automated method of sales recording of UB employees;
- improving the efficiency of UB employees;

- improving the efficiency of the bank branch.

It is assumed that this information system will have two groups of users, namely UB employees (group 1) and managers (group 2). The main function of the system will be to maintain a list that reflects the activities of the employees during the working day and mainly focus on the proper recording of sales.

Different functionality is assumed depending on the group of users.

Functionality for group 1:

1. maintaining list of sales;
2. viewing general list (sales);
3. adjusting list of sales;
4. maintaining list of clients;
5. viewing and maintaining list of tasks;
6. viewing the assessment given by the manager;
7. viewing the list of banking products (services).

Functionality for group 2:

1. viewing list of sales;
2. viewing and adjusting list of employees;
3. viewing list of clients;
4. viewing and maintaining list of tasks;
5. evaluation of employees performance (assessment);
6. formation of a general document for all employee's performance record;
7. printing of the document;
8. sending the document.

The developed IS must meet the following requirements:

- operational data entry;
- user convenience and interface unification;
- ensuring centralized management of access to system resources;
- ease of implementation and operation.

The main principles of system development are:

- scalability (the ability to increase functionality in terms of the number of tasks to be solved, types and number of interacting information systems, adaptation to various conditions of use);

- information security (ensuring the protection of information at all levels of the system in accordance with the category of information);
- ensuring high consumer properties and commercial potential of the created system.

Group 1 user maintains a list of clients, sales, current tasks.

The user of group 2 views the received lists, provides feedback on the work done by group 1 users, generates reports and an overall document for the entire branch, and eventually sends it to the bank's head office.

Today, a large number of technologies for designing organizational and technical systems are offered.

There are also a number of tools specialized for automating the design process.

The technical support of information systems is a complex of technical means that ensure the operation of the information system, the relevant documentation for these tools and technological processes [23].

3.3.6 Technical perspective

For comfortable work of the user with the system, regardless of the development methods considered in the work, it is necessary to have the following minimum hardware:

1. Intel Pentium 4 / AMD Athlon 64 or later (SSE3 capable);
2. the amount of RAM is at least 1 GB;
3. free hard disk space of at least 350 MB;
4. a monitor with a resolution of at least 1024x768;
5. Windows 7 or later.

Since the proposed information system is a web application, these requirements represent the minimum computer configuration to support an internet browser.

Currently, various database management systems are used to build information systems, which differ both in their capabilities and in the requirements for computing resources.

For development in the PHP programming language, one of the most popular and in-demand DBMS is MySQL [41].

MySQL DBMS uses a traditional client-server architecture, so when working with MySQL DBMS, the user actually works with two programs:

1. a database server program located on the computer where the database is stored. It fulfills client requests over the network and accesses the contents of the database to provide information requested by clients;

2. a client program, which is a software that connects to the server and sends requests to it.

The system is planned to be developed using the PHP programming language. PHP is a programming language used on the server side for dynamic generation of HTML pages [41].

Hypertext markup language, or HTML, is a formatting language used to display content acquired via the Internet. Every retrieval unit is referred to as a Web page (from the World Wide Web), and these pages typically have hypertext links that make it possible to obtain adjacent pages. It was created in the 1980s at the CERN laboratory in Switzerland by British scientist Sir Tim Berners-Lee. Document elements including headings, paragraphs, and tables are specified via HTML markup tags. They annotate a document so that a web browser, a piece of software, may view it. The headings, paragraphs, and tables are shown in a layout that is customized to the screen size and available typefaces once the browser understands the tags [39].

Together with HTML, CSS is used to design and style web pages. CSS stands for Cascading Style Sheets. CSS describes how HTML elements are designed and displayed.

The system also provides generation of reports and statistics on the activities of employees.

Mandatory requirements for the user's workstation software are one of the following browsers:

1. Google Chrome (version 9.0 and above);
2. Mozilla Firefox (version 10.0 and higher);
3. Microsoft Edge;
4. Opera (version 11.0 and above).

In order to be able to work with the proposed economic information system the user's computer must meet the above requirements.

All the company's computers are suitable to run the software and can be used for installation and further work with the system.

In order to make the process of system integration to the everyday work of the employees smooth, a set of training courses is to be offered to guide through the information system workflow.

4. Practical Part

4.1 Design of information system

As a result of the discovery of the disadvantages in the existing business process, a so-called “As it should be” or "TO-BE" model is created. The use of the functional model "TO-BE" leads to a reduction in the timing of the implementation of the information system.

Figure 6 shows the functional model "TO-BE", made in the EPC notation.

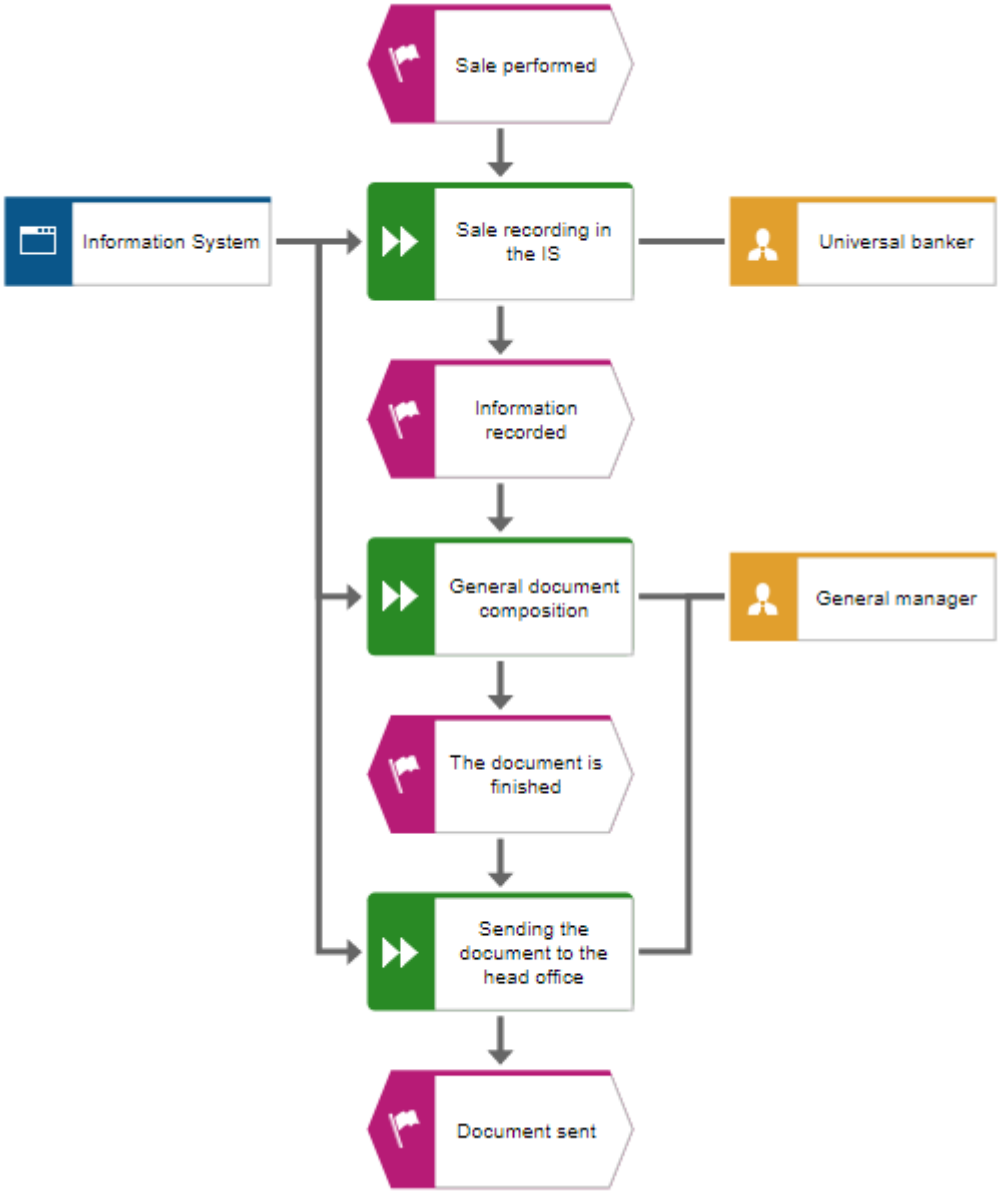

Figure 6: EPC Model "TO-BE" (Source: [author])

As a result of the introduction of the information system, the process of monitoring the activities of employees has acquired a new look. Now fixation of sales occurs only in electronic form in the IS. The recording is carried out in a general, formalized form, which eliminates the omission of the necessary information.

The department manager is no longer required to manually collect sales lists from each UB employee and form a general sales list for the department. The general list is formed automatically in the created information system. Also, now there is no need to announce the results of the work to the employee personally, the evaluation is provided in the system. A document reflecting the performance of an employee for the reporting period is sent electronically.

4.2 Information model

The information model is designed to describe the information flows of the system [26]. The model below was created using ERwin Data Modeler application [21].

The information model reflects the composition and methods of obtaining the initial information (Figure 7).

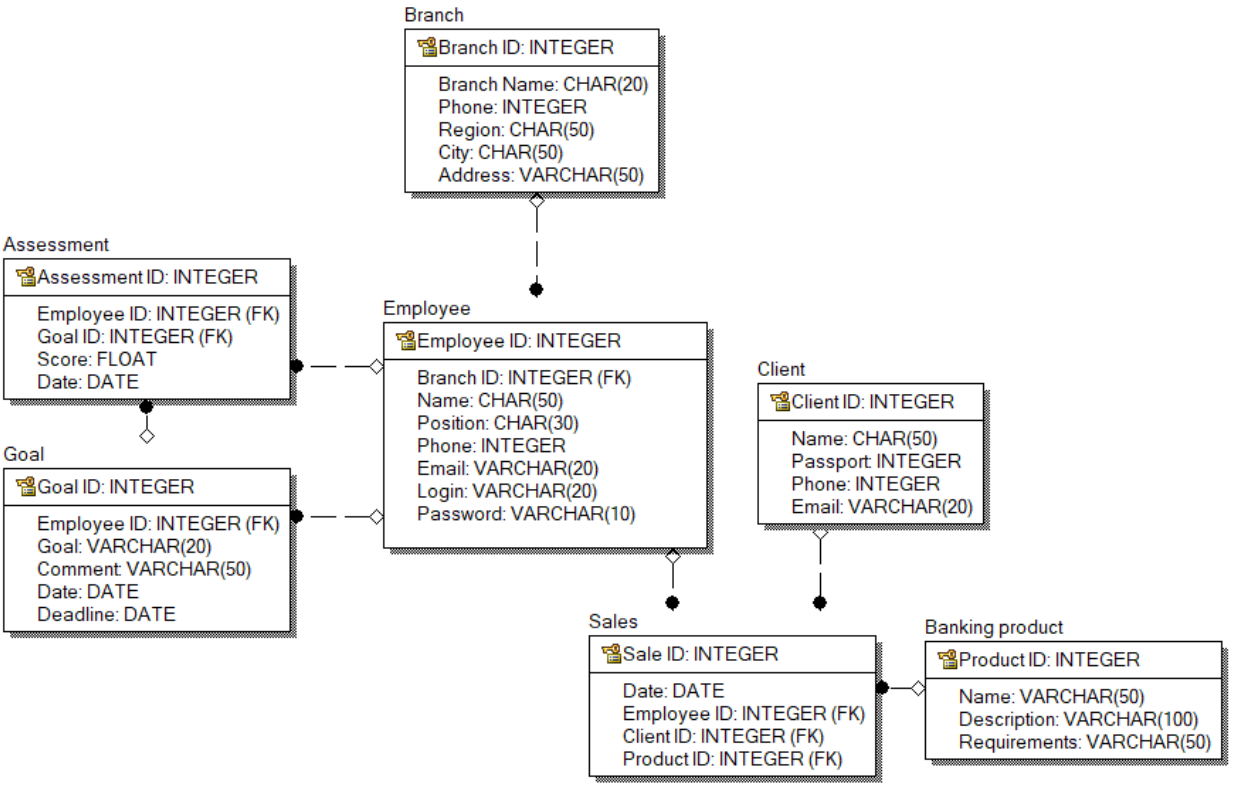

Figure 7: DB Model (Source: [author])

The contents of the information model are described in the tables below.

Table 2: Client (Source: [author])

Attributes	Data type	Size	Primary key
Client ID	Integer	10	Yes
Name	Char	50	No
Passport	Integer	20	No
Phone	Integer	20	No
Email	Varchar	20	No

Table 3: Banking product (Source: [author])

Attributes	Data type	Size	Primary key
Product ID	Integer	10	Yes
Name	Varchar	50	No
Description	Varchar	100	No
Requirements	Varchar	50	No

Table 4: Branch (Source: [author])

Attributes	Data type	Size	Primary key
Brach ID	Integer	10	Yes
Name	Char	20	No
Phone	Integer	20	No
Region	Char	50	No
City	Char	50	No
Address	Char	50	No

Table 5: Employee (Source: [author])

Attributes	Data type	Size	Primary key
Employee ID	Integer	5	Yes
Branch ID (FK)	Integer	3	No
Login	Varchar	20	No
Password	Varchar	10	No
Name	Char	50	No
Phone	Integer	20	No
Email	Varchar	20	No
Position	Char	30	No

Table 6: Sales (Source: [author])

Attributes	Data type	Size	Primary key
Sale ID	Integer	10	Yes
Employee ID (FK)	Integer	10	No
Client ID (FK)	Integer	10	No
Product ID (FK)	Integer	10	No
Date	Date	–	No

Table 7: Assessment (Source: [author])

Attributes	Data type	Size	Primary key
Assessment ID	Integer	10	Yes
Employee ID (FK)	Integer	10	No
Score	Float	–	No
Date	Date	–	No
Goal ID	Integer	10	No

Table 8: Goals (Source: [author])

Attributes	Data type	Size	Primary key
Goal ID	Integer	10	Yes
Employee ID (FK)	Integer	10	No
Goal	Varchar	20	No
Comment	Varchar	50	No
Date	Date	–	No
Deadline	Date	–	No

4.3 Function tree and system dialog script

The use of the Function Tree schemes makes it possible to visually show the hierarchy of control functions and data processing processes that are automated in the developed system [35].

Figure 8 shows the information system function tree (for UB employees).

The system provides UB employees with wide functionality that supports the considered process of sales recording and solves additional tasks that arise in the process of working within the customer service group.

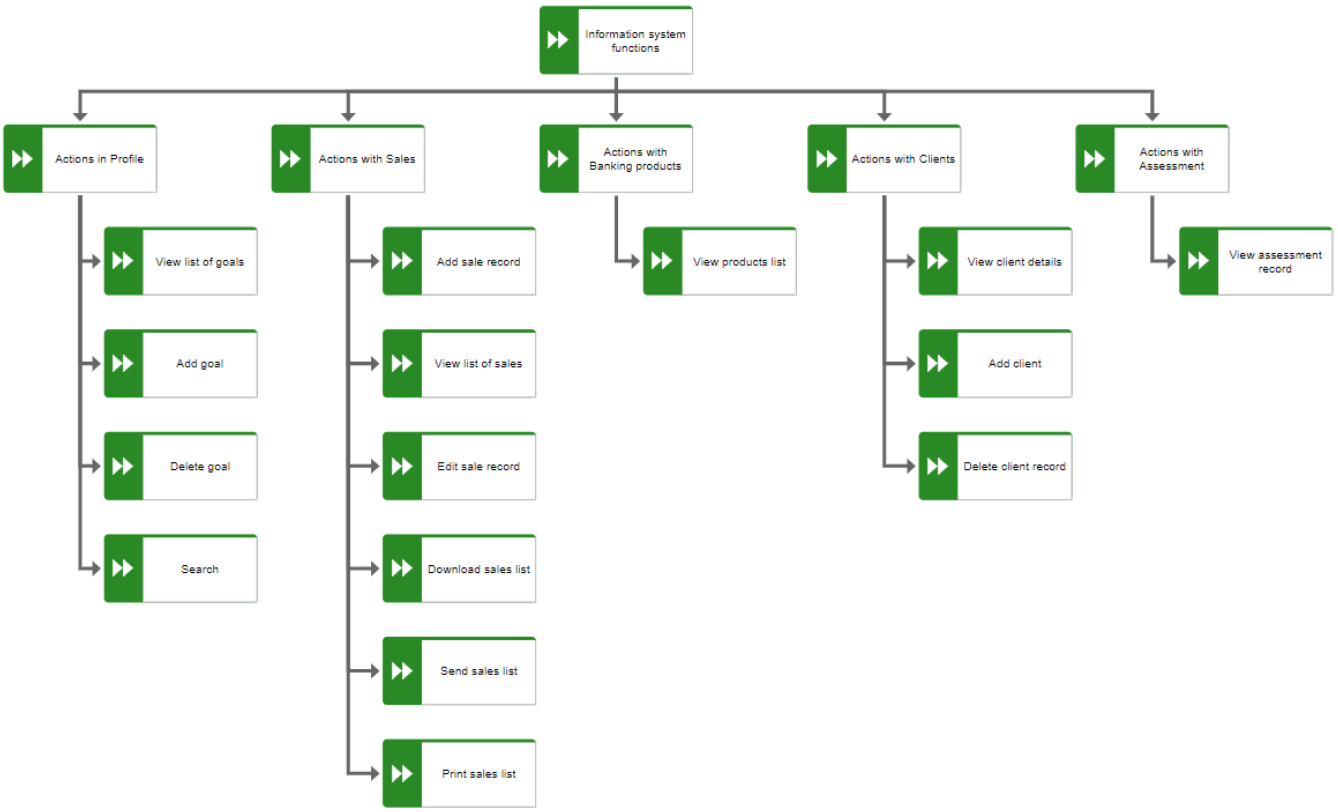

Figure 8: IS functions, user UB (Source: [author])

Figure 9 shows the IS function tree for managers.

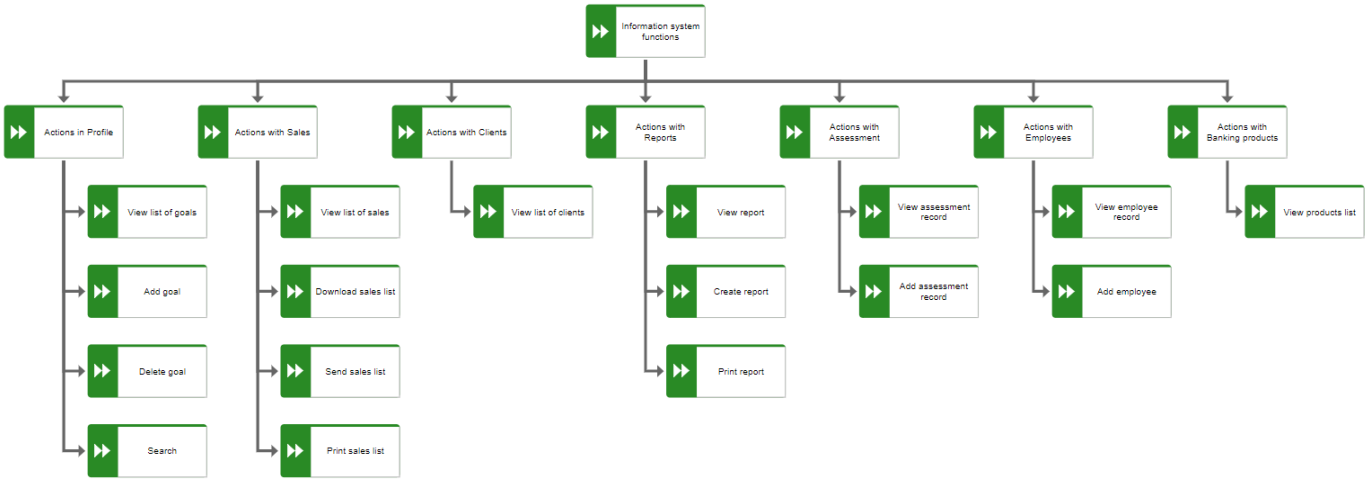

Figure 9: IS functions, user Manager (Source: [author])

As can be seen from the presented diagram, managers have at their disposal additional tabs that allow them to work with reports and maintain the list of employees.

The dialog script is a graphical representation of the way a user works with the system and represents the interactive mode of the program. The scenario is a composition of functions and their hierarchy in the system [4].

The script of the system dialogue (for UB employees) is shown in Figure 10, and the transcript of the script is presented in Table 9.

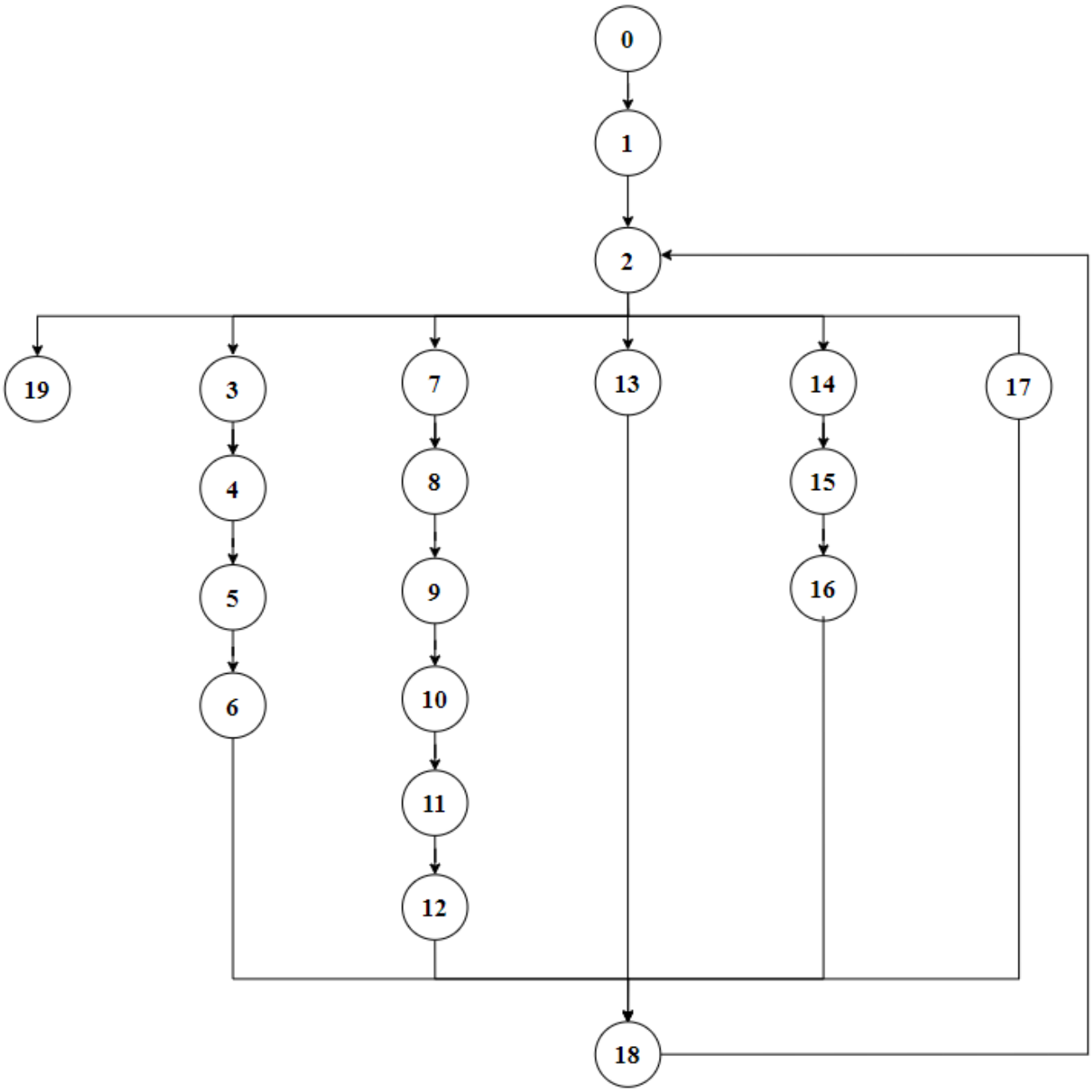

Figure 10: Dialogue Scenario Diagram, user UB (Source: [author])

Table 9: Description of the dialog script, user UB (Source: [author])

ID	Action
0	Start of the application
1	Authorization
2	Menu
3	View list of goals
4	Add goal
5	Delete goal
6	Search
7	Add sale record
8	View list of sales
9	Edit sale record
10	Download sales list
11	Send sales list
12	Print sales list
13	View products list
14	View client record
15	Add client
16	Delete client record
17	View assessment record
18	Back
19	Exit

The script of the system dialogue (for Manager) is shown in Figure 11, and the transcript of the script is presented in Table 10.

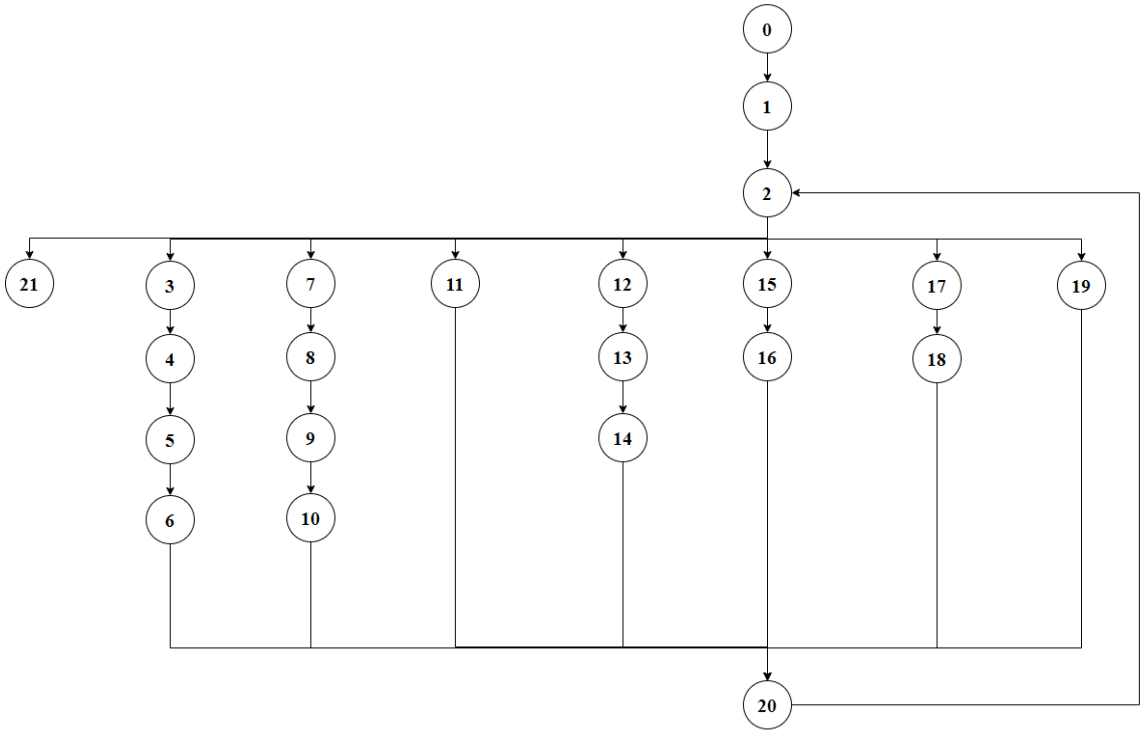

Figure 11: Dialogue Scenario Diagram, user Manager (Source: [author])

Table 10: Description of the dialog script, user Manager (Source: [author])

ID	Action
0	Start of the application
1	Authorization
2	Menu
3	View list of goals
4	Add goal
5	Delete goal
6	Search
7	View list of sales
8	Download sales list
9	Send sales list
10	Print sales list
11	View list of clients
12	View report
13	Create report
14	Print report
15	View assessment record
16	Add assessment record

17	View employee record
18	Add employee
19	View products list
20	Back
21	Exit

A dialogue scenario can be viewed as a sequence of system transitions from one state to another. None of the states should end in a deadlock, meaning the user should be able to switch from any current state of the dialogue to the one he needs.

4.4 Structural diagram

As a part of the development of the information system, software modules to be created for:

- input;
- storage;
- processing;
- search;
- reporting.

Each individual software module is perceived by the system as a whole, so all the procedures and functions of the software module are performed in a single context.

Figure 12 shows a tree of program modules (for UB employees), reflecting the block diagram of the package.

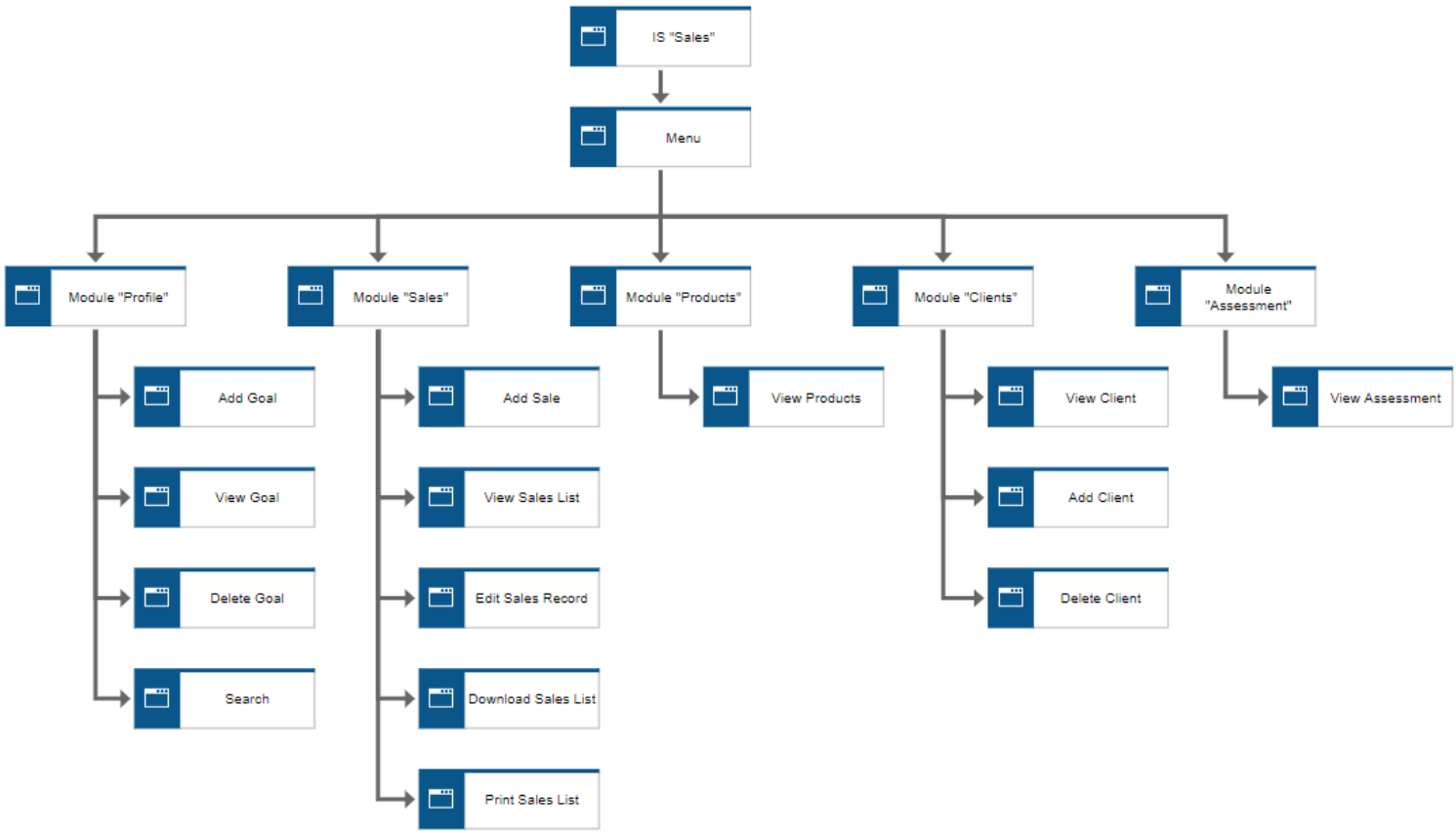

Figure 12: Tree of program modules of information system, user UB (Source: [author])

Figure 13 shows a tree of program modules (for managers), reflecting the block diagram of the package.

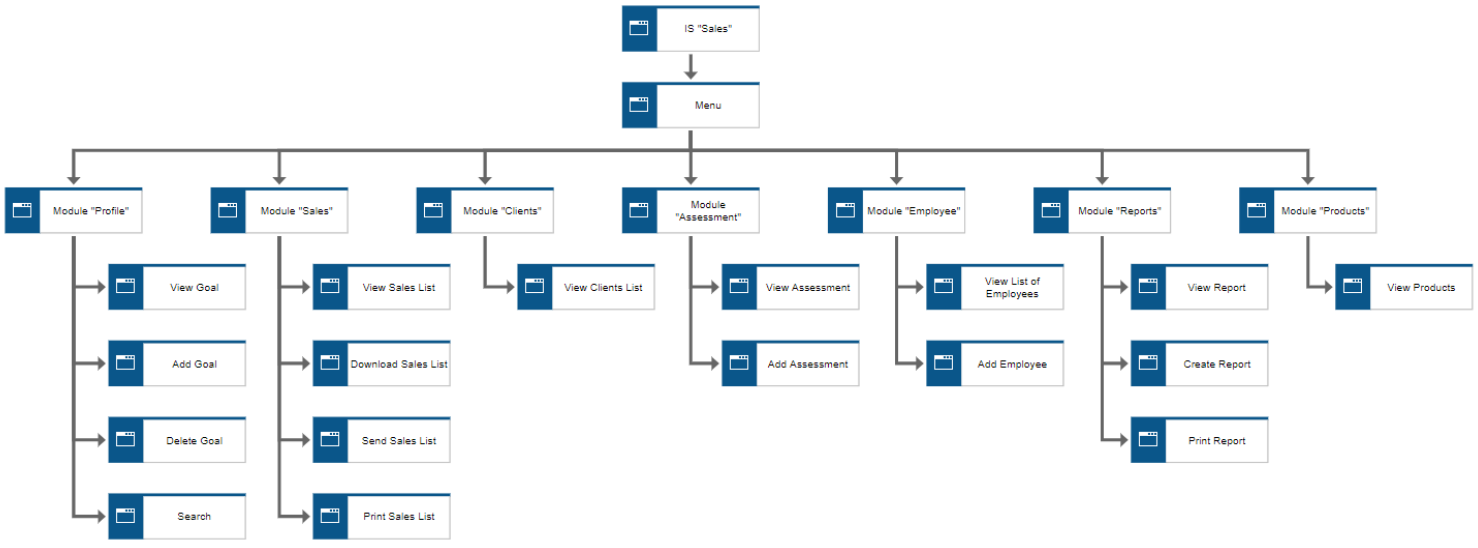

Figure 13: Tree of program modules of information system, user Manager (Source: [author])

4.5 Algorithms and descriptions of software modules

Algorithm diagram (flowchart) – a graphical representation of a program or algorithm using standard graphic elements denoting commands, actions, data, etc. (Source: [55]).

The block diagram displays a systematic sequence of stages of the work.

A block diagram of the information system (for UB employees) is shown in Figure 14.

This diagram shows how a UB employee will interact with the system, the sequence of actions during work.

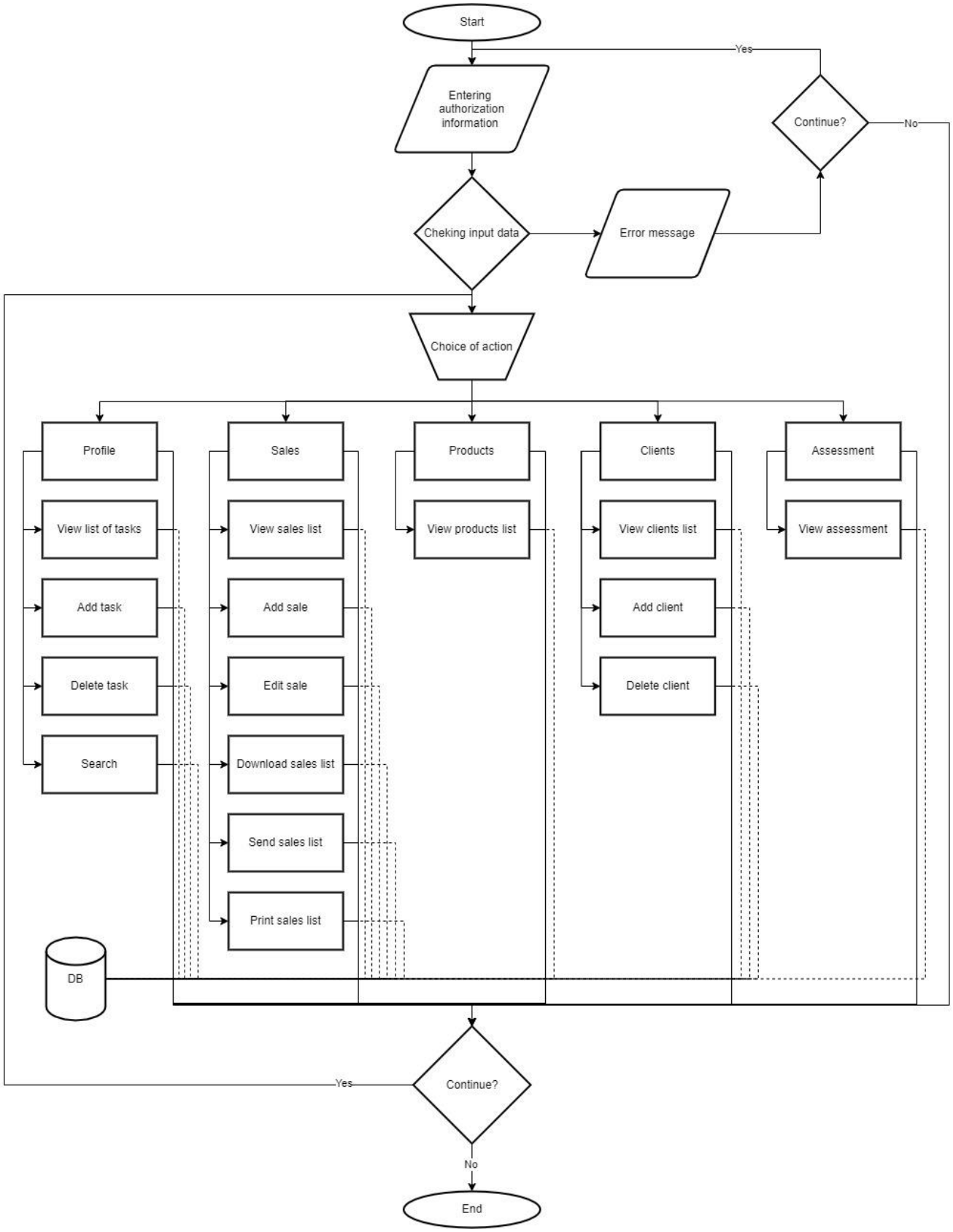

Figure 14: Block diagram of system software modules, user UB (Source: [author])

A block diagram of the information system (for managers) is shown in Figure 15.

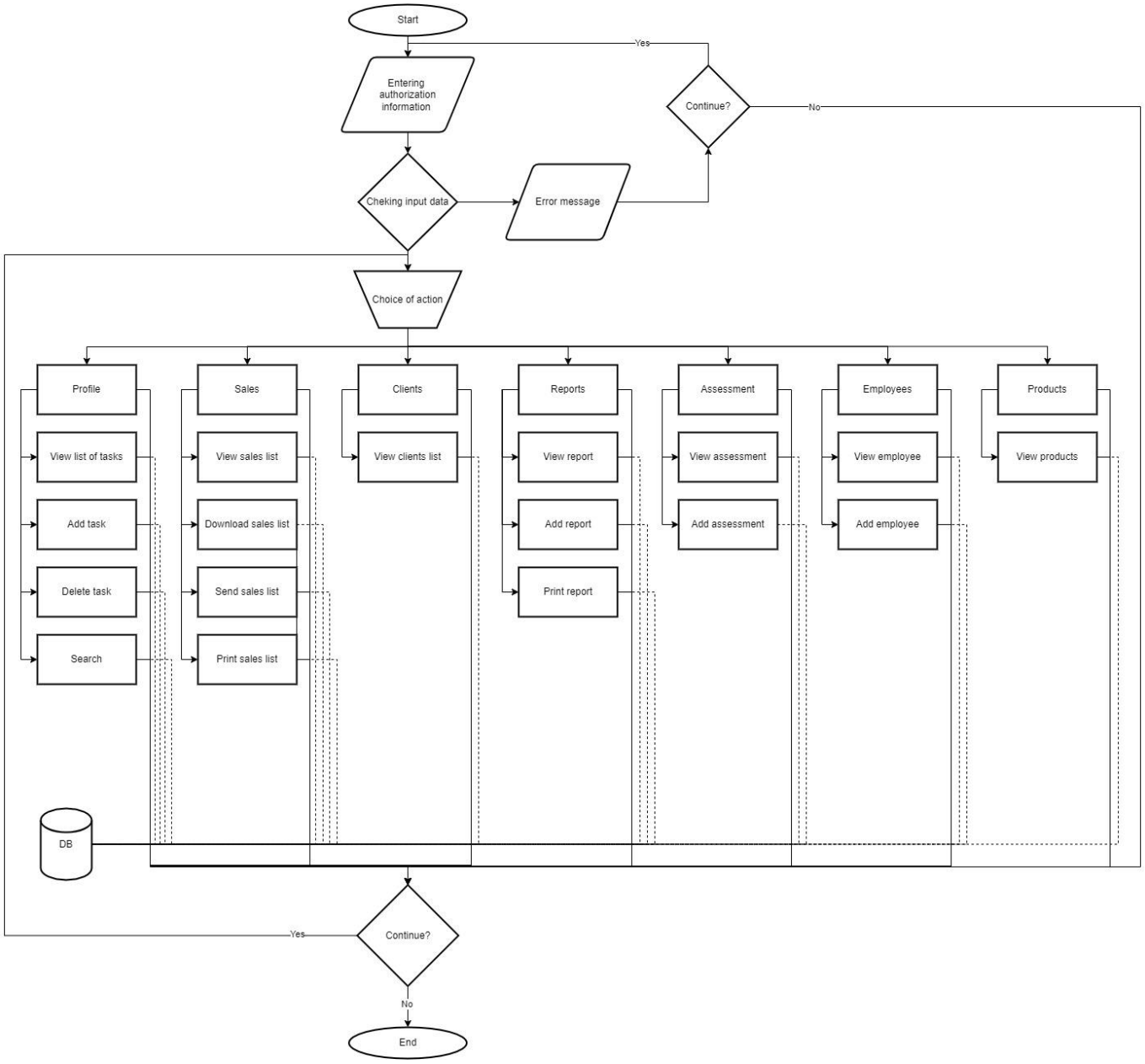

Figure 15: Block diagram of system software modules, user Manager (Source: [author])

The above diagram shows the systematic sequence of work in the system from the point of view of managers.

It is obvious that the work with the system will differ depending on the group of users.

4.6 Information system prototype

The suggested interface of the information system is shown in the figures below. Authorization page to restrict unauthorized access to the system (Figure 16).

Figure 16: Authorization page (Source: [author])

In Figure 17 it is shown the main view on the system with a menu on the left side as well as employee and branch information on the top right of the page. There is also the possibility to add a new sale record as well as view previously added records and adjust them.

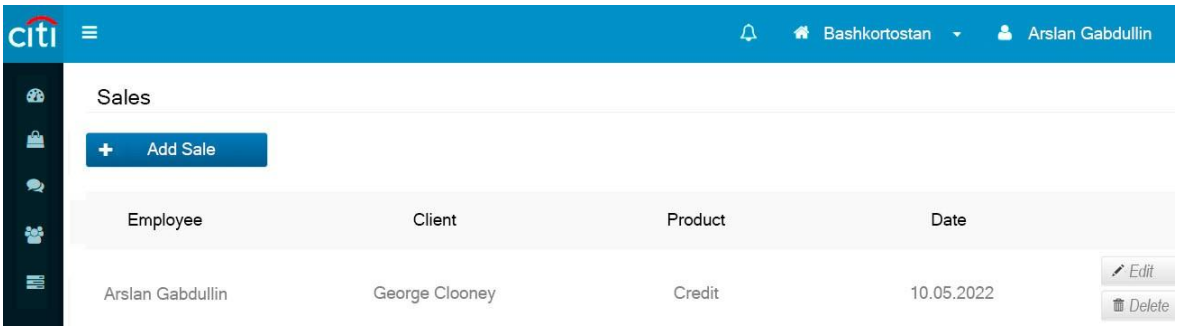

Figure 17: System view (Source: [author])

In Figure 18 and 19, two versions of the menu are shown depending on the user group.

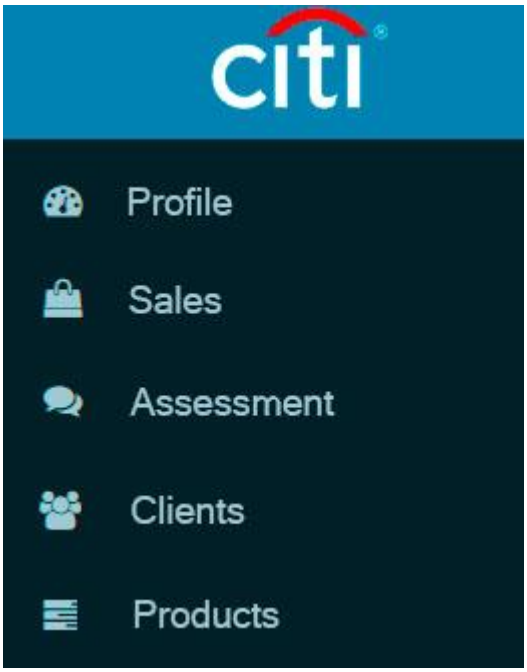

Figure 18: Program menu, UB employee view (Source: [author])

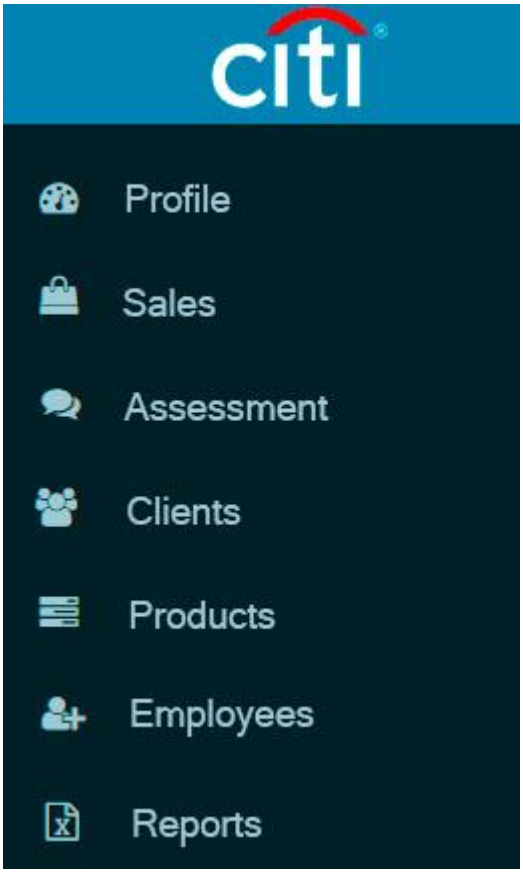

Figure 19: Program menu, Manager view (Source: [author])

4.7 Economic analysis

Businesses utilize the economic or cost-benefit analysis as part of a systematic procedure to determine which options to take and which to ignore. The analysis adds up the potential benefits anticipated from a circumstance or course of action before deducting the overall expenses related to that course of action [28].

To keep the track of sales, the company plans to create a software, the development of which is divided into the following stages:

1. acquaintance with the topic, analysis of the necessary functionality;
2. selection and study of reference literature;
3. development of the algorithm and structure of the program;
4. programming and testing.

System development costs include general (development of the system itself) and operational.

The following costs to be taken into account:

1. direct material costs;
2. salary fund;
3. deductions for social needs;
4. depreciation charges;
5. other expenses.

It is assumed that the introduction of the information system will significantly reduce the time and labor costs for the implementation of the process, which will increase the monthly cash flow due to the reorganization of the working hours of the UB employees and managers.

To perform the analisis, it is required to calculate:

1. net present value of the investment project (NPV);
2. discounted payback period (DPBP);
3. profitability index (PI) [19].

4.7.1 Calculation of economic efficiency

As discussed in the previous section it is necessary to consider the amount of expenses needed from the company in order to bring the suggested system to life. The following expenses to be calculated: time expenses, material expenses,

Time costs for design and development are shown in table 11.

Table 11: Time to be spent on the design and development of IS (Source: [author])

Stages of IS development	Time, hours
Acquaintance with the topic, analysis of the necessary functionality	11
Selection and study of reference literature	18
Development of the algorithm and structure of the program	17
Programming and testing	146
Total	192

The calculation of material costs is given in the table 12. The costs are presented in local currency for the Bashkortostan Citibank branch.

Table 12: The calculation of material costs is given in the table (Source: [author])

Materials	Unit	Amount	Cost per unit, RUB	Cost total, RUB
Paper	piece	160	1	160
Printer Cartridge	piece	2	500	1000
Energy costs	kw/hr	120	3	360
Total	–	–	–	1520

Direct material costs amounted to 1520 RUB.

To determine the wage fund, it is required to calculate the wages of IS developers, create a balance of working hours (table 13).

Table 13: Working time balance (Source: [author])

Working Time Fund	Unit	Total
Number of calendar days in a year	days	365
Number of days off and non-working days per year	days	118
Number of working days per year	days	247
Working hours	hours	8
Annual working time fund	hours	1976

The hourly wage rate (Hr) is determined by the formula (1) (Source: [28]):

$$Hr = (S * M * (P + 1)) / F, \quad (1)$$

where S – salary, RUB;

M – months a year minus vacation;

P – salary bonus factor;

F – actual annual fund of working time (hours).

Let the average monthly salary of a software engineer and an IS developer be equal to (S) = 50000 rub (18429.27 czk).

With M = 11 months, F = 1976 hours, P = 0.17 (17%), Hr amounts to 325.66 rub/hour (120.03 czk/hour).

The amount of the basic salary is determined based on the time spent on the work and the cost of an hour of work of the contractor.

The basic salary is determined according to the schedule of the main stages of work.

The calculation of the wage fund is shown in table 14. The amounts are presented in local currency for the Bashkortostan Citibank branch as well as converted to CZK for convenience.

Table 14: Calculation of the salary fund (Source: [author])

Stages of IS development	**Hourly rate, RUB**	**Hourly rate, CZK**	**Time, hours**	**Sum, RUB**	**Sum, CZK**
Acquaintance with the topic, analysis of the necessary functionality	325.66	120.03	11	3582.26	1320.33
Selection and study of reference literature	325.66	120.03	18	5861.88	2160.54
Development of the algorithm and structure of the program	325.66	120.03	17	5536.22	2040.51
Programming	325.66	120.03	146	47546.36	17524.38
Wage (total)	–	–	–	62 526.72	23046.43
“Ural” coefficient (15%)	–	–	–	9379	3456.96
Bonus coefficient (+17%)	–	–	–	10629.54	3917.89
Total	–	–	192	82535.26	30421.28

Total salary fund amounts to 82535.26 RUB or 30421.28 CZK.

The amount of deductions for social needs is determined based on the size of the wage fund. The calculation is shown in table 15.

Table 15: Deductions for social needs (Source: [author])

Deductions	Share of payroll fund, %	Sum, RUB	Sum, CZK
To the pension fund	22.3	18405.36	6783.95
Health insurance	2.6	2145.92	790.95
Social insurance	2.9	2393.52	882.22
Total	27.8	22944.8	8457.12

The full cost estimate for system development (“Build” costs) is shown in table 16.

Table 16: Calculation of costs for the development of IS (Source: [author])

Expenses	Sum, RUB	Sum, CZK
Salary fund	82535.26	30421.28
Deductions for social needs	22944.8	8457.12
Material costs	1520	560.25
Total	107000.06	39438.66

Calculation of monthly operating costs (“Run” costs) of the system is shown in table 17.

Table 17: Calculation of system operation costs per month (Source: [author])

Expense	Sum, RUB	Sum, CZK
Hosting	300	110.58
The share of the IT specialist's salary for IS maintenance	2500	921.46
Energy costs	200	73.72
Total	3000	1105.76

To assess the effectiveness of implementation, cash flows from the sale of banking products for the nearest future were predicted for the months shown in table 18. According to the discussion earlier, it is assumed that the introduction of the information system will significantly reduce the time and labor costs for the implementation of the process, which will increase the monthly cash flow.

Table 18: Calculation of planned cash flows (Source: [author])

Month	Sales increase, %	Sum, RUB	Expenses	CF, RUB	CFt, RUB
1	0	0	3000	-3000	-3000
2	1	10000	3000	7000	4000
3	1	10000	3000	14000	11000
4	1	10000	3000	21000	18000
5	1	10000	3000	28000	25000
6	1	10000	3000	35000	32000
7	1	10000	3000	42000	39000
8	1	10000	3000	49000	46000
9	1	10000	3000	56000	53000
10	1	10000	3000	63000	60000
11	1	10000	3000	70000	67000
12	1	10000	3000	67000	74000
13	1	10000	3000	84000	81000
14	1	10000	3000	91000	88000
15	1	10000	3000	98000	95000
16	1	10000	3000	105000	102000
17	**1**	**10000**	**3000**	**112000**	**109000**
18	1	10000	3000	119000	116000
19	1	10000	3000	126000	123000
20	1	10000	3000	133000	130000
21	1	10000	3000	140000	137000
22	1	10000	3000	147000	144000
23	1	10000	3000	154000	151000
24	1	10000	3000	161000	158000

Net present value (NPV) calculated by the formula (2) (Source: [17]):

$$NPV = CFt/(1+k) - I, \tag{2}$$

where NPV – net present value;

CFt – cash flow at the end of t-period;

k – bank rate;

I – cost of implementing an investment project (investment).

NPV = 158000 / (1+0.1) – 107000.06 = 36636.3.

Profitability index (PI) calculated by the formula (3) (Source: [11]):

$$PI = (CFt/(1+k))/I, \quad (3)$$

where PI – profitability index;

CFt – cash flow at the end of t-period;

k – bank rate;

I – cost of implementing an investment project (investment).

PI = (158000 / (1+0.1)) / 107000.06 = 1.34.

Discounted payback period (DPBP) calculated by the formula (4) (Source: [49]):

$$DPBP = t + CFt/CF, \quad (4)$$

where DPBP – discounted payback period;

t – period;

CF – cash flow at the beginning of t-period;

CFt – cash flow at the end of t-period.

DPBP = 1 + 3000 / 7000 = 1.43.

4.7.2 Interpretation of calculated indicators

A positive indicator of net present value shows that the cost of invested capital will increase as a result of the project implementation, it indicates that the project of the system implementation can be accepted and approved as it will generate income for Citibank. The return on investment ratio shows that one monetary unit invested in the implementation of the project accounts for 1.34 monetary units of profit. The DPBP indicator reflects that the implementation of this project will pay off in 1.43 years (≈ 17 months). Significant efficiency of the development and implementation of the system is observed.

Table 19 clearly shows the results of the calculation of economic efficiency.

Table 19: Calculation results (Source: [author])

Index	Value
Implementation time (hours)	192
Net present value (NPV) (monetary units)	36636.3
Profitability Index (PI) (monetary units)	1.34
Discounted payback period (DPBP) (years)	1.43

As a result of the economic analysis, it was concluded that the development and implementation of the suggested software is economically beneficial for Citibank.

5. Results and Discussion

During the internship in CB Citibank Bashkortostan branch there have been the opportunity to investigate the organisation and its processes from the inside observing it within day-to-day work. It allowed to research and analyse the company as well as determine the bottlenecks in some of the working processes. As a result, a decision was made to look into one of the business processes in details.

In the work, several information models were created to describe the banking organisation of Citi and its business processes. Based on these models and business requirements, a prototype of an information system was suggested. Eventually the economic evaluation showed that the development and implementation of the proposed information system is financially beneficial for the company.

Employees of the customer service department of Citibank spend a lot of their working time on numerous labour-intensive accounting and technical operations of information processing. The implementation of information technology is a progressive and cost-effective direction in the work of enterprises and organizations in any field of activity and particularly in banking sphere.

With the introduction of an information system, work processes will be greatly simplified in Bashkortostan branch of Citi. Many actions that required attention and took time of the staff will be automated. All this will simplify the process and save bank's employees from unnecessary work. Authorization will prevent unauthorized access from outside. The purpose of designing the application is to create a unified information network that allows to efficiently store and process information.

The proposed information system suggests the following functionality divided by 2 groups of users (UB employees and managers).

Functionality for group 1 (UB employees):

1. maintaining list of sales;
2. viewing general list (sales);
3. adjusting list of sales;
4. maintaining list of clients;
5. viewing and maintaining list of tasks;
6. viewing the assessment given by the manager;
7. viewing the list of banking products (services).

Functionality for group 2 (managers):

1. viewing list of sales;
2. viewing and adjusting list of employees;
3. viewing list of clients;
4. viewing and maintaining list of tasks;
5. evaluation of employees performance (assessment);
6. formation of a general document for all employees performance record;
7. printing of the document;
8. sending the document.

From economic perspective, the analysis showed the following results:

- Net present value (NPV) showed positive value – the suggested implementation project can be approved;
- Profitability Index (PI) amounted to 1.34 – the system implementation is profitable;
- Discounted payback period (DPBP) amounted to 1.43 – the money invested in the development will be paid off in 17 months.

Table 20 additionally highlights the outcomes of the calculation of economic efficiency.

Table 20: Economic calculation results (Source: [author])

Index	Value
Implementation time (hours)	192
Net present value (NPV) (monetary units)	36636.3
Profitability Index (PI) (monetary units)	1.34
Discounted payback period (DPBP) (years)	1.43

As a result of the economic analysis, it was concluded that the development and implementation of the suggested software is economically beneficial for Citibank.

Therefore, the initial objective of the work has been reached. Based on the created models and diagrams as well as economic analysis – investing in development and implementation of the information system is justified and recommended for Citibank.

In the future, there is a possibility of extending the functionality of the proposed information system in case respective business requirements are raised.

6. Conclusion

In the diploma thesis work, a detailed analysis of the subject area was carried out, the process of work of the customer service group of Citibank was studied. During the analysis of the company, various models were created to reflect the activities of both the department and the company as a whole. Organizational structure was shown as well as function and product trees.

The main issues in the work of the customer service department's employees were identified, on the basis of which the task was set to develop a prototype of an information system. Using the ARIS methodology, an organizational structure, "AS-IS" and "TO-BE" models as well as models that describe the structure of the suggested information system were built.

As a result of the analysis of the enterprise, a decision was made to suggest the development of an information system for two groups of users. Universal banker employees maintain list of clients, sales, current tasks. Managers view the received lists, provide feedback on the work done by UB, generate reports and an overall document for the entire branch, and eventually send to the head office of Citibank.

The proposed IS must meet modern requirements for working in the banking sector as well as be scalable and secure. In order to propose the way an employee would interact with the system; algorithm diagram was created with explanation of every step. The algorithm showcases different ways of working with the suggested system depending on the groups of users (UB employees or managers).

Eventually, the design of the IS was proposed showing the suggested interface of the program with variable number of available pages depending on the user group.

Additionally, the calculation of the economic efficiency of implementation was made to evaluate the financial advantages of creating the system. The economic analysis showed that the calculated amount of money for the development of the system (initial investment) is economically justified and will be paid off within 1.43 years.

The introduction of the economic information system for UB employees and managers will increase the efficiency of the customer service group, ensure the convenience of sales recording process, and automate the centralized collection of sales information with the creation of a general report for the Bashkortostan branch of Citibank.

Taking into consideration the above, it can be concluded that throughout the work the initial objectives were reached, the information models were created as well as the prototype of an information system was suggested with economic justification.

7. References

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