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FUNDAMENTALS OF ORGANIZING CUSTOMER FLOW SERVICES

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The purpose of the textbook "Fundamentals of Organizing Customer Flow Services" is to provide students with a mastery of modern approaches to organizing customer flow services in trade, as well as the basis for calculating its probabilistic characteristics in order to make informed decisions in the economic activities of a trade organization. The study manual is used within the discipline "distance trading", "digital forms and methods of sales" and others. The textbook is prepared in accordance with the program of the discipline of the same name and is intended for students majoring in 38.03.06 "Trade business".

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Introduction

Accounting for customer flow has a direct impact on the business operations of retail organizations, largely determining their effectiveness. Established cultural traditions play an important role in shaping consumer demand. Consumer behavior is the activity directly involved in acquiring and consuming products and services, including the decision processes that precede and follow these activities.

Store positioning involves defining the target audience, developing a unique selling proposition, and creating an image of the store in the minds of consumers. Determining the optimal number of sales personnel to effectively serve customer flow is a pressing issue.

Uneven customer flow in retail organizations is one of the challenges of the retail business. It depends on many factors: the type of retail organization, time, seasonality, and subjective and objective factors dependent on the customer.

To successfully distribute customer flow evenly, schedules are created to roughly estimate store traffic and peak hours, during which it is necessary to focus full attention and deploy the necessary additional resources.

Enhancing loyalty through discounts, charity events, holidays, contests, and the introduction of discount and loyalty cards directly impacts the smoothness of customer flow in retail organizations.

Retail is characterized by highly variable customer flows. This leads to queues, regardless of the customer service sys-

tem's parameters. Therefore, a problem arises when customers abandon their purchases at the checkout due to the long wait. In particular, if the checkout line seems excessively long or slow, some customers opt to leave the queue and not complete their planned transaction. A missed sale results in direct financial losses and negatively impacts customer satisfaction and loyalty.

The purpose of the "Fundamentals of Organizing Customer Flow Service" textbook is to provide students with modern approaches to organizing customer flow service in retail, as well as a basis for calculating its probabilistic characteristics for informed decision-making in retail organizations.

1. Model of consumer behavior in trade

Established cultural traditions play an important role in shaping consumer demand. Consumer behavior is the activity directly involved in acquiring and consuming products and services, including the decision processes that precede and follow these activities.

In order to make informed decisions aimed at stimulating retail sales, it is necessary to comprehensively study the following issues:

- how consumers make purchase decisions;
- what factors influence consumer purchase decisions;
- how consumer characteristics and their environment influence purchases;
- who or what has the greatest influence on the purchase decision;
- what criteria are used to select a product and place of purchase.

Consumer behavior is influenced by two types of stimuli. Marketing stimuli include four elements: product, price, distribution methods, and sales promotion methods. Other stimuli are made up of major forces and events in the buyer's environment, economic, scientific, technological, political, and cultural environment. All of these stimuli, once they pass through the "black box" of the buyer's mind, elicit a series of observable consumer responses: product choice, brand choice, retailer choice, time of purchase, and purchase quantity choice. The task of the marketer is to understand what is happening in the "black box"

of the consumer's consciousness between the receipt of stimuli and the manifestation of responses to them. The "black box" itself consists of two parts. The first is the buyer's characteristics that influence how a person perceives stimuli and reacts to them. The second part is the process of making a purchasing decision, on which the result depends.

Buyer characteristics are formed under the influence of both external and internal factors. External factors include cultural influence factors: culture, subculture, social status and social factors: reference groups, family, roles and statuses. Internal factors include, first of all, personal factors: age, gender, marital status, stage of the family life cycle, occupation, economic status, lifestyle, personality type and a person's self-image. The second group of internal factors consists of psychological factors: motivation, perception, assimilation, beliefs and attitudes.

Most of these factors are beyond the control of marketers. But they must be taken into account when developing a sales promotion program.

It should be noted that in many cases the characteristics of buyers are not easy to identify. Buyers' behavior may be exploratory in nature and not fit into generally accepted standards. For example, a conservative consumer may initiate the purchase of new products, and, conversely, an innovator may adopt the conservative's behavior model. Customer behavior is the activity directly involved in the acquisition and consumption of products and services, including the decision-making processes that precede and follow this activity.

In order to make informed decisions aimed at stimulating sales in the retail trade, a comprehensive study of the following issues is necessary:

- how do consumers make a purchase decision;
- what factors influence consumers' purchasing decisions;
- how do consumer characteristics and their environment affect purchases;
- who or what has the greatest influence on the purchase decision;
- what criteria are used to select the product and place of purchase?

The behavior of buyers is influenced by two types of motivating factors. Marketing motivators include four elements: product, price, product distribution methods, and sales promotion methods. Other stimuli are composed of the main forces and events from the buyer's environment, economic, scientific, technical, political, and cultural environment. Having passed through the «black box» of the buyer's consciousness, all these stimuli cause a number of observable consumer reactions: the choice of a product, the choice of a brand, the choice of a trading company, the choice of the time of purchase, the choice of the purchase volume.

The task of the market leader is to understand what happens in the "black box" of the consumer's consciousness between the arrival of stimuli and the manifestation of responses to them. The "black box" itself consists of two parts. The first part is the characteristics of the buyer that influence how a person perceives and reacts to stimuli. The second part is the process of making a purchasing decision, on which the result depends.

The characteristics of the buyer are formed under the influence of both external and internal factors. External factors include factors of cultural influence: culture, subculture, social status, and social factors: reference groups, family, roles, and

statuses. Internal factors include, first of all, personal factors: age, gender, marital status, stage of the family life cycle, occupation, economic status, lifestyle, personality type, and a person's self-image. The second group of internal factors consists of psychological factors: motivation, perception, assimilation, beliefs, and attitudes.

For the most part, these factors are beyond the control of market leaders. But they should definitely be taken into account when developing a sales promotion program.

It should be noted that in many cases, the characteristics of buyers are not easy to identify. The behavior of buyers may be search-based and not fit into generally accepted standards. For example, a conservative consumer can initiate the purchase of new products, and on the contrary, the innovator can perceive the model of behavior of the conservative.

Cultural factors have the greatest and most profound influence on consumer behavior.

Culture. Culture is the widely accepted norms and values that are assimilated by society and determine the general norms of behavior. It is the main root cause that determines the needs and behavior of a person.

The concept of culture includes three sets of factors that form a model of culture – a three-dimensional matrix. This matrix represents the totality of a set of cultural values, the material environment and the institutional (social) environment.

A set of cultural values is the totality of all the values that a person has created in the course of their activities. These include material values, which are various objects: books, works of art, buildings and structures, etc. – and the spiritual accumulations of humanity– relationships, knowledge, ideas.

In the material environment, these values can manifest themselves in the form of the economic development of the country, the characteristics of the region, the scientific level, etc.

In the institutional (social) environment, cultural values can manifest themselves in the form of the legal policy of the state, the peculiarities of political activity, the business environment, religious and national characteristics of society.

The strongest influence of culture on the behavior of buyers occurs in the areas of self-perception: this is the definition of yourself, your place, role in the world, awareness of your social status, self-confidence, worldview, assessment of the space in which a person is constantly located, the idea of time, preferences in clothing and appearance, eating habits. Culture also significantly influences relationships in the family, organization, society, values and norms, beliefs, mental processes and learning, work style, and experience.

The teaching and inculcation of cultural values takes place from the birth of a person, when his parents and the people around him inculcate existing and assumed values from day to day. Culture does not contain instincts, but it affects how they are satisfied. Cultural values determine the direction of consumer behavior, as a result of which sometimes the individual's own needs and needs can take a back seat.

Culture most often acts as a kind of limiter of needs and ways to meet them. Often, under the influence of cultural values, traditions, and customs, people are forced to leave their needs not fully satisfied. This is because values are fairly well-established beliefs, ideas that the consumer accepts over a long period of their life. On the other hand, the values of any person can change, acquiring a new form.

There is a link between cultural values and consumption goals. The importance of culture and cultural values in consumer behavior and its dynamic development have led to the need for research on their nature. Currently, two research methods are widely used: the method of inventory of cultural values and the method of interviewing respondents.

In accordance with the first method, all possible values that can prevail in the consumer in the process of purchasing a product are described and studied. Taking into account the analysis of each of the studied values, a strategy is formed for each product relative to this value. Usually, there are 8 basic values that prevail in the modern buyer:

- self-realization, success, growth;
- emotional arousal;
- a sense of achievement;
- self-esteem, self-esteem growth;
- a sense of belonging, connection, communication;
- respect by other people;
- emotional and physical security;
- fun, joy, a pleasant pastime.

When using the second method, special marketing research is conducted to identify the structure of consumer values, as well as the dynamics of their changes. Respondents (the interviewed) can be either specially selected people who fit a certain market segment, or random people who are interviewed directly at stores or on the street.

Culture influences all human activities. There is a culture of work and life, an economic and social culture, a culture of family relations, etc.

One of the types of culture is the culture of consumption – this is the prevailing form of use of the entire set of consumer goods by the members of a given society. It includes beliefs about consumer values and norms that regulate consumption and consumer habits that arise from the constant consumption of goods, consumer rights and obligations.

Consumer culture has objective and subjective aspects.The objective aspect of the consumer culture includes the characteristics of the product, the conditions of its purchase, sale, i.e. what exists independently of the consumer. The subjective aspect reflects the individual's attitude to the product and its properties, how a person perceives the product and remakes it to suit his taste.

The culture of consumption is not sustainable. It is in a constant process of change and reproduction. The dynamics of consumer culture is manifested in the rapid change of preferences, fashion, consumer basket, in the form of their presentation and interpretation (often prestigious things quickly become old-fashioned, etc.).

The rationing of consumer culture consists of certain parts, such as:

- norms – rules and patterns of behavior dictated to a person by the prevailing culture in his society;
- ideals – desirable norms that are admired, but not available in the present and near future;
- samples – patterns of behavior that are recommended to the buyer as the most desirable;
- law – a set of norms and patterns of behavior, enshrined in legislative acts. For violation of rights, there is a liability, also stipulated by law.

Subculture in addition to the general culture that is common to most members of society, there are also subcultures in any social association of people. A subculture is the culture of a large group of people who belong to a larger social group. Subculture is different from culture. Subcultural differences in the modern world are determined by various factors: ethnicity, religious preferences, occupation, region, gender, age, social-class factors, etc.

A subculture may coincide in some views with the main culture, such subcultures are called supportive. There are also subcultures, the values of which are opposed to the values of the main cultures, these subcultures are called counterculture. Sociologists believe that the term "counterculture" refers to a subculture that not only differs in its values from those of the dominant culture, but also challenges it, thereby provoking a culture war. Recently, in many cases, members of society are suspicious of the subculture, because they do not know what to expect from it. If, with the help of subcultures, a person can perceive and express the basic values of society in different ways, then the counterculture speaks of an individual contradiction and rejection of the samples of the main culture of society. The desire to accept the values of the counterculture arises in the individual as a result of the negative experience of following the patterns of the dominant cultures. At the same time, it is worth noting that conflicting values of the counterculture can cause long-term disagreements in society. Sometimes the values of the counterculture penetrate the mainstream culture through the media and become part of the culture itself. At the same time, the impact on the dominant culture can be both positive and negative. For the purposes of sales promotion, the

study of subcultures common in the occupied market is important, since their neglect can cause not only their disregard by representatives of individual products or trading enterprises, but also open dissatisfaction.

Social status. In almost every society, there are different social (social) classes – relatively stable groups within society, characterized by the presence of their members of similar values, interests and behaviors based on their economic situation. A social class is determined not on the basis of a single variable, but on the basis of occupation, income, education, value orientation, and similar characteristics of its members, and there is always the possibility of switching from one class to another.

Individuals belonging to the same class tend to behave in much the same way. They are characterized by general preferences of goods, brands in clothing, household supplies, leisure activities, cars.

Social class influences people's opinions about how they should shop. People from the lower classes usually prefer local familiar shops. Upper- and middle-class consumers are more confident in their purchasing abilities, they can go shopping in unfamiliar places and are ready to search the entire store to find the right thing.

Because social classes exhibit different patterns of consumption, they constitute natural market segments. Therefore, some market leaders focus their efforts on a single social class. The target social class assumes a certain type of store in which the product should be sold, the choice of certain means of dissemination of information for its advertising, and a certain type of sales promotion activities.

Reference groups. Numerous reference groups have a particularly strong influence on human behavior. Reference groups are groups that have a direct (i.e. personal contact) or indirect influence on a person's relationships or behavior.

Groups that have a direct influence on a person are called membership groups. These are the groups that the individual belongs to and interacts with. Some of these collectives are primary, and interaction with them occurs regularly. These are family, friends, neighbors, and work colleagues. Primary collectives are often informal. In addition, a person belongs to a number of secondary collectives, which, as a rule, are more formal, and interaction with which is not permanent. These are various kinds of public organizations, religious associations, professional associations and trade unions, etc.

Primary groups are usually the most influential ones. They are rather small social formations and are characterized by cohesion and motivated participation in joint activities. Members of such a group exhibit similar beliefs and behaviors.

The individual is also influenced by groups to which he does not belong. They can be desirable – a group to which a person wants or strives to belong, and undesirable – a group, the values and behavior of which the individual does not accept.

It is advisable for market participants to identify all the reference groups of the specific market in which they sell their products. Reference groups influence people in at least three ways. First, the individual is confronted with new behaviors and lifestyles. Second, the group affects the individual's attitude and self-image, as he tends to "fit in" with the group. And third, the group pushes the individual to conform, that is, to conform to some recognized or required

standard, which can affect their choice of specific products and brands.

Family. A strong influence on the behavior of the buyer can be exerted by his family members. The family in which a person is born is called the guiding (orienting) family. Here a person receives instructions about religion, politics, economics, ambition, self-respect, love. Even when the buyer no longer interacts closely with their parents, their influence on their unconscious behavior can still be very significant. In countries where parents and children continue to live together, parental influence can be decisive.

A more direct influence on everyday purchasing behavior is exerted by the individual's generated family, i.e., his spouse and children.

The family is the most important consumer purchasing organization in society, and it is subjected to a comprehensive study. Market leaders are interested in the roles of husband, wife, children, and the influence that each of them has on the purchase of a variety of goods and services.

The family has an important social or group influence on individual shopping decisions. This influence manifests itself mainly in two areas. First of all, the stage (stage) of the family life cycle, being already a personal (internal) factor, as shown in Figure 2, determines to a large extent the nature of purchases made by its members. Demographic factors of age, marital status, and having children play an important role in shaping individual and joint shopping behavior. These issues are discussed in detail in the next section. In addition, the family often acts as one of the most influential reference groups for the consumer, exerting normative, comparative, and informational influence on them.

Roles and statuses. An individual is a member of many social groups. In any social group, a person occupies a certain position (a salesman, an engineer, a manager is a professional position; a member of a political party is a social and political position; a young man, a child, a father, a son, etc.). Any position implies the presence of others associated with it (director-subordinates), and, consequently, the presence of relationships. The normative system of actions expected of an individual in accordance with his social position is called the role. Thus, the role to a certain extent does not depend on the individual characteristics of a person, but is determined by his place in the structure of relations.

Each role has a certain status that reflects the degree of positive evaluation of it by society. A person often chooses products that speak about his status in society. So, the company's presidents drive Mercedes or Cadillac cars, wear expensive, beautifully tailored suits. Market leaders are aware of the potential for turning goods into status symbols, but it should be remembered that such symbols differ significantly not only for different social classes, but also for different geographical areas.

Age and stage of the family life cycle. With age, there are changes in the range and nomenclature of goods and services purchased by people. In the first years, a person needs products for baby food. In the years of growing up and maturity, a person eats a wide variety of foods, in old age – special dietary ones. Over the years, a person's tastes in clothing, furniture, recreation, and entertainment have also changed.

As mentioned above, the nature of consumption also depends on the stage of the family life cycle. There are the following main stages of the family life cycle:

- young singles – earnings are relatively small, but the need for goods is also small, so there are some amounts of free money left. These people are focused on fashion and leisure, spending a significant portion of their income on clothing and vacations;
- young couples – young couples without children are usually in a better position compared to the previous stage, because there are two sources of income. They account for the maximum number of purchases, and in particular durable goods: furniture, household appliances, cars;
- young parents – the appearance of the first child significantly changes the structure of spending and consumption;
- mature families – the structure of consumption still largely depends on children, significant amounts are spent on their education. At the same time, with the growth of parents' income, it becomes possible to replace durable items, purchase luxury items;
- older households – in adulthood, people usually follow the usual pattern of consumption or reduce it due to a decrease in income. More money is spent on medical care and recreation.

Economic situation. The economic situation of an individual greatly affects his choice of goods. It is determined by the size of the expenditure part of income, the size of savings and assets, creditworthiness, and views on spending funds as opposed to their accumulation.

Lifestyle. Individuals belonging to the same subculture, the same social class, and even the same occupation may lead completely different lifestyles. Lifestyle – the established forms of human existence in the world, which find their expression in their activities, interests and beliefs.

Lifestyle draws a "comprehensive portrait" of a person and their interaction with the environment. It shows more than the fact of belonging to a certain social class or type of personality. Knowing that a person belongs to a particular social class, we are ready to draw certain conclusions about his intended intention, but we cannot imagine him as an individual. Knowing a person's personality type, we can draw certain conclusions about their distinctive psychological characteristics, but we are unlikely to learn much about their activities, interests, and beliefs. And only the way of life will draw us an exhaustive portrait of a person in his actions and interaction with the world around him.

Personality type and self-image. Each person has a very specific type of personality that influences their buying behavior. Personality type – a set of distinctive psychological characteristics of a person that ensure the relative consistency and constancy of his responses to the environment.

The personality type is usually described on the basis of such individual traits as self-confidence, alertness, influence, attachment, independence, aggressiveness, fickleness, restraint, deference, love of power, sociability, love of order, adaptability. In addition, each person has an idea of himself, i.e. a mental image of himself.

Knowing the type of personality can be useful in analyzing consumer behavior, when there is a certain relationship between the types of personalities and the choice of products or brands. Market leaders should strive to create an image of a product or trading enterprise that corresponds to the images of their own "I" of the target market members.

Motivation. At any given time, a person experiences many different needs. Some of them have a biogenic nature, i.e. they

are the consequences of such states of internal physiological tension as hunger, thirst, and discomfort. Others are psychogenic, i.e. they are the results of such states of internal mental tension as the need for recognition, respect, and spiritual closeness. Most of these needs are not intense enough to motivate a person to perform an action at any given time. A need that has reached a sufficiently high level of intensity becomes a motive.

Motive (or motion) – a need that has become so urgent that it forces a person to look for ways and means to satisfy it. Satisfaction of the need reduces the internal tension experienced by the individual.

Psychologists have developed a number of theories of human motivation. The most popular of them are the theory of Sigmund Freud and the theory of Abraham Maslow.

Freud believed that people are mostly unaware of the real psychological forces that shape their behavior, that a person grows, while suppressing a lot of drives. These drives never completely disappear and are never completely under control. Thus, a person does not fully understand the origins of their own motivation.

Abraham Maslow believes that human needs are arranged in order of hierarchical importance from the most to the least urgent. According to the degree of importance, the needs are arranged in the following order: physiological needs, self-preservation needs, social needs, needs for respect and needs for self-affirmation. A person will strive to meet first of all the most important needs. As soon as he manages to satisfy some important need, it temporarily ceases to be a driving motive. At the same time, there is an incentive to satisfy the next most important need. For example, a starving person is not interested in

events taking place in the world of art and politics. As the next most important need is met, the next one comes to the fore.

Perception. A motivated person is ready for action. The nature of his actions depends on how he perceives the situation. Any stimulus is known through sensations, i.e. through the flow of information that affects the senses: sight, hearing, smell, touch, and taste. However, everyone organizes and interprets this sensory information in their own way, so different people, being equally motivated, can act differently in the same objective situation, because they perceive this situation differently.

Perception is the process by which an individual selects, organizes, and interprets incoming information to create a meaningful picture of the world around them.

Perception depends not only on the nature of the physical stimuli, but also on the relationship of these stimuli to the environment and the individual. People may have different responses to the same stimulus due to selective perception, selective distortion, and selective memorization.

Selective perception means that consumers may perceive the same information differently due to different needs, motivations, and experiences. The individual is simply unable to respond to all stimuli. A person weeds out most of them. People are more likely to notice stimuli:

- related to their current needs;
- the ones they expect;
- sharply different in some of their values from the usual ones.

Selective distortion. Even the stimuli noticed by the consumer are not necessarily perceived by them as it was intended by the sender. Each person strives to fit the incoming information

into the framework of their existing opinions. Selective distortion refers to the tendency of people to transform information, giving it personal significance. At the same time, people tend to interpret information in such a way that it supports, rather than challenges, their established ideas and judgments.

Selective memorization. Much of what a person learns is simply forgotten. People tend to remember only information that supports their attitudes and beliefs.

Assimilation. A person learns knowledge in the process of activity. Assimilation is the process and result of cognitive activity-the acquisition of knowledge, competences, skills. Under the influence of accumulated experience, certain changes occur in the behavior of the individual.

In the process of assimilation, two directions can be distinguished: generalization and the establishment of differences.

Generalization is a form of increasing the volume of knowledge by mentally moving from the particular to the general. It is carried out by comparing a group of objects (or representations of them) and identifying their identical, repetitive or common properties.

The opposite of the generalization process is the process of making distinctions. Establishing differences means that a person has learned to recognize differences in sets of stimuli and can make appropriate changes in their response.

Beliefs and attitudes. Through actions and assimilation, a person acquires beliefs and attitudes. And they, in turn, influence his buying behavior.

A belief is an individual's mental characterization of something. Beliefs can be based on real knowledge, opinions, or just faith. They may or may not be accompanied by an emo-

tional charge and are the basis of relationships and further actions.

Attitude – a stable favorable or unfavorable assessment of an individual of an object or idea, the feelings experienced towards them, and the direction of possible actions, formed on the basis of existing knowledge and beliefs.

Relationships allow an individual to behave relatively stably in relation to objects that are similar to each other. A person does not have to re-interpret something, and each time react in a new way. Relationships allow you to save physical and mental energy. That is why they are difficult to change. The various relationships of an individual form a logically coherent structure, in which changing one element may require complex adjustment of many others.

Thus, the final choice of an individual is the result of a complex interaction of factors of a cultural, social, personal, and psychological nature. Many of these factors are not influenced by the market actor. However, knowing them is useful for identifying buyers with an increased interest in the product. Other factors are influenced by the market leader and suggest to him the most effective ways to stimulate sales, allowing to cause the strongest response from buyers.

2. Organization of interaction with customers in trade

Store positioning involves defining the target audience, developing a unique selling proposition (USP), and creating an image of the store in the minds of consumers. For example, a store may choose a premium strategy, targeting premium customers, or focus on low prices, attracting mass buyers. The choice of positioning influences many aspects of service organization. Service organization encompasses all customer interaction processes, from the moment the store enters the store to after-sales service.

Let's look at several examples of the relationship between service organization and market positioning:

- Premium stores: These stores offer a high level of service, including a personal manager, a convenient payment system, and delivery. They create an image of exclusivity and prestige;
- Mid-price stores: In this case, the main focus is on an optimal price-quality ratio, convenient store locations, and an acceptable level of service;
- Discounters: These stores focus on minimal service costs, offering low prices and a simple shopping experience.

One of the key elements of a retail organization's customer service system is building post-sales interactions with customers. Post-sales interactions are the actions a company takes to contact a customer after they make a purchase.

Post-sales interactions may include:

- Assistance with setup and installation;
- Support: the ability to contact the company with questions or complaints after a purchase;
- Warranty service;
- Post-warranty service: repairs and maintenance after the warranty period;
- Preventive maintenance;
- Rewards and bonuses;
- Useful and educational materials.

Customer interactions using a CRM system.

Customers are the key to the successful operation of any organization, their resource and income. In today's marketplace, there is a constant battle for customers. Attracting, retaining, selling, and motivating repeat purchases are the main goals of a set of customer engagement activities. The fundamental principle of effective interaction is based on a personalized approach to customers. Customer relationship management involves a thorough understanding of them.

The result of this customer research will be an interaction strategy that takes into account their needs and strives to satisfy them. This will be effective, unlike simply matching customers to the product the company offers. In other words, the product should match the customer, not the customer. This personalized approach significantly improves interactions, increases loyalty, builds a customer base, and ultimately enhances the company's success in the marketplace.

Customer relationship management is achieved using various technical solutions.

One solution is the use of a Customer Relationship Management system, commonly known as CRM.

The system is software that collects customer information. CRM stores this data, allows for its analysis, and allows for its management.

The essence of a CRM system is broader and deeper than that of simple software. It represents a specific customer interaction strategy. Its goal is to optimize customer interactions, strengthen relationships with them, increase the value of each customer, and ultimately make the company more competitive.

CRM systems are divided into four types: operational, analytical, collaborative, and combined.

Operational CRM helps process a large flow of incoming requests. It creates cards with primary customer information and records the history of interactions with the customer. Operational CRM also helps monitor employee performance and generate reports.

Analytical CRM identifies sales patterns and the effectiveness of promotion channels. It helps segment the customer base, evaluate profitability, and forecast financial performance.

Collaborative CRM provides integration with other customer interaction services. Collaborative CRMs are primarily used to collect customer feedback and, conversely, transmit information from the company to the customer.

Combined CRM incorporates elements of all the systems listed above. Such CRM systems are most often used for large projects that require analytics, sales, customer interaction, and the ability to share information between different departments.

Digital technologies offer retail organizations new opportunities to improve customer interactions and optimize opera-

tional processes. The implementation of digital technologies in business has led to increased productivity due to more efficient workflows, instant communication between organizations and customers, and, ultimately, exponential technological advances.

Furthermore, customers in the digital environment have the opportunity to share information about their personal user experience in a variety of ways. Traditional companies, like digital ones, can use digital technologies to build closer relationships with customers not only through products but also through additional experiences and services, with the goal of increasing brand loyalty and repeat purchases.

Digital technologies enable the development of a business model whose key elements are:

- Deep understanding of the consumer;
- Ensuring an improved user experience;
- Selecting the right marketing strategy;
- Effective process execution and management;
- Using metrics to achieve success.

In the context of digitalization, key trends in the development of forms and methods of organizing retail activities can be identified. In traditional retail, the introduction of modern technologies allows for increased efficiency through the implementation of databases, data processing systems, and electronic interaction with counterparties. Customer service is directly related to the implementation of machine vision and self-checkout systems. Smart shelves and smart lighting are also among the innovative technologies in modern retail.

Artificial intelligence and machine learning are beneficial in many areas, including retail. In particular, artificial intelligence helps analyze customer behavior and their shopping carts, and

based on this, personalized offers are made to different categories of customers through loyalty programs.

Augmented reality (AR) is a technology that adds virtual elements to the real world. Virtual reality (VR) is a completely artificial world that shows what it might be like if everything were different.

Omnichannel is an approach that involves the mutual integration of disparate communication channels into a single system to ensure seamless and continuous communication with customers. It involves using multiple channels to communicate with customers, and it is through the use of a single system that customers feel a continuous interaction with the company.

In addition to improving the customer experience, an omnichannel approach also allows for:

- increasing traffic and sales;
- enhancing customer loyalty;
- improving the quality of collected data.

Promising digital technologies in retail also include the Internet of Things, cloud services, geographic information systems, digital twin technology, and a number of others.

3. Mathematical foundations of consumer flow research

Retail is characterized by highly variable customer flows. This leads to queues, regardless of the customer service system's parameters. Therefore, a problem arises when customers abandon their purchases at the checkout due to the long wait. In particular, if the checkout line appears excessively long or slow, some customers opt to leave the line and not complete their planned transaction. A missed sale translates into direct financial losses and negatively impacts customer satisfaction and loyalty.

Specifically, British shoppers believe that waiting around nine minutes in line is sufficient reason to change their mind and leave, especially if there are more than seven people in front of them. Overall, 86% of shoppers (based on UK surveys) try to avoid stores altogether if they perceive the checkout line to be too long. These figures clearly demonstrate the psychological threshold for waiting: many people are simply not prepared to endure a long wait just to make a purchase.

It's worth noting that long queues not only discourage new customers but also undermine the loyalty of existing ones. Around 74% of respondents would rather switch to a competing store if they saw faster service, and 70% of shoppers are less likely to return to a store where they once experienced a long wait at the checkout. As a result, stores lose sales not only immediately but also in the future. According to research, nearly 66% of consumers (for example, in the UK) abandoned

a purchase at least once in the past six months because of a long checkout line, and only 22% of them subsequently returned to the store to complete the purchase. In other words, the vast majority of such abandoned transactions remain unfulfilled, and the share of shoppers willing to "wait until the end" does not exceed a quarter of cases (around 26%, according to surveys). This underscores the scale of the problem: long waits lead to significant revenue loss and drive shoppers to competitors.

Of course, queue length primarily depends on the number of open checkouts. This increases system throughput and reduces customer wait times. Opening additional checkouts is especially important during peak hours. This is when customer traffic is highest, and customer loyalty to queues is at its lowest. Many supermarkets are equipped to quickly deploy a backup checkout when a queue forms, and stores employ additional cashiers. Even small retailers can call on unscheduled help during peak periods: for example, the store owner can staff the checkout themselves, or employees can work unscheduled shifts for increased pay. Proper management of staff schedules ensures a sufficient number of open checkouts precisely during peak customer traffic.

The characteristics of the target customer segment vary for different product groups, resulting in varying customer flow densities. This allows staff to maneuver between departments as needed.

In addition to increasing the number of cashiers, retailers are trying to redistribute customer traffic over time. One approach is to direct some customers to less busy periods through special promotions. For example, offering discounts to customers arriving in the store during weekday mornings encourages

some customers to shop early and smooths out peak traffic. As a result, lines are shorter during the traditionally busy evening hours, improving the customer experience.

Increasing the efficiency of checkout staff is an important area. Service speeds can vary significantly among cashiers: one employee can process a line twice as fast as another thanks to their training and attentiveness. Many companies are implementing incentive systems for cashiers to speed up their work during peak periods. Sales associates are encouraged to serve customers as quickly as possible during peak hours, offering additional bonuses for their high work rate. To ensure objectivity, modern POS systems are used that track the number of receipts processed by each cashier and the service time. This data allows management to fairly distribute incentives and identify service bottlenecks. However, it's important to note that the characteristics of the product range sold, and therefore service times, depend on the location of the checkout counter within the sales area.

First of all, self-checkout counters are becoming increasingly common in retail. The use of automated retail methods helps reduce personnel costs. It should be noted, however, that self-checkout counters require additional controls to prevent customer misconduct. However, increasing the number of checkout counters reduces customer traffic, which shortens queues and positively impacts customer satisfaction. Customers also value speed and are willing to switch to new formats if it saves them time.

Of course, automated checkout lines aren't the only solution to the queue problem. Specialized queue management systems are widely used: sensors, people counters, and cameras

with artificial intelligence elements that monitor the number of people waiting and the speed of service in real time. Such systems can automatically alert managers or cashiers to open an additional checkout lane if the queue exceeds a preset limit. Analyzing the collected data allows for predicting peak loads and scheduling additional staff shifts in advance, increasing checkout throughput.

Another digital approach is informing customers about store occupancy and wait times. For example, Yandex.Maps, in collaboration with major retailers, allows for remote checkout status: hundreds of supermarkets are connected to the project, allowing users to see whether there is a queue at the checkout lane of a selected store. This data, received from internal customer counting systems, helps people choose the optimal time to shop and avoid long queues.

Finally, some retailers are experimenting with fully automated, cashier-less stores using automatic purchase recognition technology. Such projects are still limited in scope. Experts note that completely unmanned retail encounters technical difficulties and risks of loss, so it has not yet been widely implemented in mass retail.

Scientific empirical studies quantitatively confirm the impact of queue length on the likelihood of completing a purchase. For example, a field study by researchers at Columbia University (in a supermarket) showed that increasing the queue length from 10 to 15 people reduces the proportion of completed purchases from approximately 30% to 27%, equivalent to a 10% drop in sales. The authors note that the negative effect is already noticeable at queue lengths above average (i.e., more than ~5 people). Interestingly, shoppers react specifical-

ly to the visible length of the queue, sometimes more acutely than to the actual wait time. For example, reducing the queue from 12 to 6 people increased the likelihood of a purchase by approximately 5%, while increasing the number of cashiers from one to two (even though this also halved the wait time) increased the likelihood of a purchase by only 0.9%. Both measures formally halved the wait time, but the queue reduction had a significantly stronger effect on customer behavior, suggesting a psychological perception: the sight of a long line is more deterrent than the estimated time spent standing in it. Thus, queue length acts as an important factor directly influencing a customer's decision: whether to continue waiting and purchase the item or abandon the purchase.

In the retail context, this problem has significant consequences. Long checkout lines during peak hours can lead to mass abandonment of purchases, which directly reduces a store's daily revenue. Furthermore, the frustration of long waits creates a negative impression of the store. Research shows that a significant percentage of customers who leave without making a purchase due to queues never return. This represents not only a one-time loss of sales but also potential customer churn. For businesses, such effects translate into significant losses: it is estimated that long waits in lines are one of the main factors in lost revenue in offline retail, second only to out-of-stock items. Some studies have calculated that ineffective queue management can cost stores millions, even billions, in lost revenue annually.

Longer checkout lines significantly increase the likelihood of a customer canceling their purchase. Understanding this phenomenon is crucial for retail management. Retailers

are trying to implement solutions to reduce queues: opening more checkout counters, optimizing staff performance, and introducing electronic queue management systems. The goal of these measures is the same: to minimize the number of abandoned purchases. After all, convenient and fast payment not only prevents direct sales losses but also increases customer satisfaction, strengthening their trust in the store. Therefore, studying the impact of queue length on purchase abandonment helps retailers develop effective service strategies to prevent customers from leaving without making a purchase.

The task of determining the size of the cash node of the store is important in modern trade. An increase in the size of the cash point leads to an increase in the cost of staff training and an increase in the payroll fund, as well as to inefficient use of the area. Reducing the size of the cash node leads to an increase in queues, a decrease in the quality of service.

In the classical theory, the number of cash desks is determined primarily based on the area of the store's trading floor. However, a large number of factors influence the size of a store's checkout unit.

The various assortment of goods sold by a trade organization is characterized by both the average service time and its different variability. From the point of view of optimizing the number of cash registers, it is the variability of service time, aggravated by the variability of the flow of customers, that has a negative impact on the economic activity of trade organizations. The increase in the variability of customer flows leads to a decrease in the average load factor of the cash desk, while the queues themselves and, accordingly, the outflow of customers will be higher.

An important factor is the positioning of the store. Obviously, premium segment stores have very different requirements for the quality of service. In such stores, the occurrence of large queues is unacceptable, while the service time for one customer is quite high. The friendly attitude of the cashier, the answers to all the questions of the buyer lead to an improvement in the image of the store, but only in the absence of queues. Of course, the flow of customers is highly dependent on probabilistic factors, and it is impossible to completely guarantee the absence of queues. In this situation, it is important to increase the comfort level of the customer waiting in line. To this end, the buyer may be offered additional free services and gifts, such as a cup of coffee. An important element in improving the comfort of waiting is the use of an electronic queue system. In economy class stores, the situation is different. In these stores, the main criterion is the level of prices for the goods sold. The very attitude of the buyer to the queues is more loyal. The social function of such stores is also important. These factors determine, first of all, the requirements for reducing the costs of a trade organization.

The efficiency of economic activity, the main indicator of which is undoubtedly profit, is determined by the number of buyers, the income from one buyer and the costs incurred by the trade organization. Thus, the achievement of maximum efficiency is realized by forming a balance between the number of customers who left the store or later refused its services, and the costs of the trade organization. The presence of small queues is also a positive factor for the trade organization. The checkout area is hot, while waiting in line, the buyer can examine the goods offered to him in sufficient detail.

The very way of organizing queues also affects the efficiency of the economic activity of a trade organization. The way of organizing the general queue into several cash desks reduces the average waiting time in the queue, while the fast-moving queue is more positively perceived by customers. Various methods can be used to organize a general queue, from directing customer flows with the help of decorative grilles to organizing an electronic queue system. The electronic queuing system is quite effective in terms of customer comfort, but the costs of its implementation are higher, in addition, the switching time of the system is also higher.

The location of the trading organization has a huge impact on determining the number of cash desks. When a trading organization is located in the zone of influence of transport hubs, the ratio of the buyer to the queue and the probability of the buyer's refusal to purchase is primarily determined by the schedule of vehicles. Moreover, the buyer will evaluate the very possibility of visiting the trade organization, depending on the predicted waiting time in line and the buyer's time availability.

The current trend is the transition to self-service devices for customers. With the introduction of these technologies, there is a saving on maintenance personnel, but at the same time, maintenance time increases, which leads to a loss of usable area. The very same costs for sales personnel are also decreasing, but it is required to increase the security service in order to avoid theft.

The optimization of the flow of customers during the working day has great potential. The development of incentive measures depending on the time of day and the day of the week

can be used as a mechanism for such regulation. This will allow leveling the corresponding fluctuations in the customer flow.

Currently, many trade organizations use the system of cash desk differentiation depending on the quantity of goods purchased. This approach leads to an increase in the average queue across the entire sales organization, but at the same time, different buyers will spend different times in the queue. The buyer, who has collected a large assortment of goods, has already spent more time both on the selection of goods and on the road to it. The choice of store is made by the buyer in advance, taking into account a lot of factors. The probability of leaving such a buyer is much lower, but the loss of the store from his departure is also higher. All this leads to the search for a certain compromise between the number of cash desks that allow serving customers with a small number of purchases, and the growth of queues at other cash desks. The dimensions of the checkout node are determined by the optimal maximum flow of customers, at which all cash desks work and the average waiting time for a customer in the queue does not exceed rational indicators. The schedule of cashiers' exit during the working day is determined based on the non-linearity of the flow of customers.

In modern retail, determining the number of a store's cash registers is an important task. Increasing the number of cash registers leads to a growth of personnel training costs and wages budget as well as to inefficient use of store space. But reducing the number of cash registers leads to longer lines and lower quality of customer service.

Traditionally, the number of cash registers is determined primarily based on the size of the store's floor space. However,

the number of a store's cash registers can be affected by a lot of factors.

The variety of goods sold by a store is characterized by both average service time and its variability. From the point of view of optimizing the number of cash registers, it is the variability of service time aggravated by the variability of the customer flow that has a negative effect on the business of retail organizations. Growing variability of customer flows leads to a decrease in the average load of the cash register, while the lines will be longer and, accordingly, the number of lost customers will be higher.

The efficiency of business (the main characteristic of which is profit undoubtedly) is determined by a number of customers, revenue per customer, and costs incurred by a retail organization. Thus, maximum efficiency is achieved through a balance between the number of customers who left the store without a purchase or later stopped using its services and the retail organization costs.

Also, short lines are better for retail organizations than no lines at all. Checkout area is important; while waiting in line, customers can notice goods on offer and examine them in sufficient detail.

The way of organizing the lines also has an impact on the efficiency of the retail organization business. Organizing a common line for several cash registers reduces the average waiting time in the line, and a quickly moving line is perceived by customers in a more positive way.

Input data for the simulation (Figure 1) are customer flow; number of cash registers (with a common line, no more than 2; with separate lines, not limited); way of organizing the lines;

economic parameters such as average bill, number of working hours per month, cashier's salary, and cash register expenses taking into account the loss of space; probabilistic parameters such as probability of customers' leaving without a purchase depending on the line length or probability of an impulse purchase in the line.

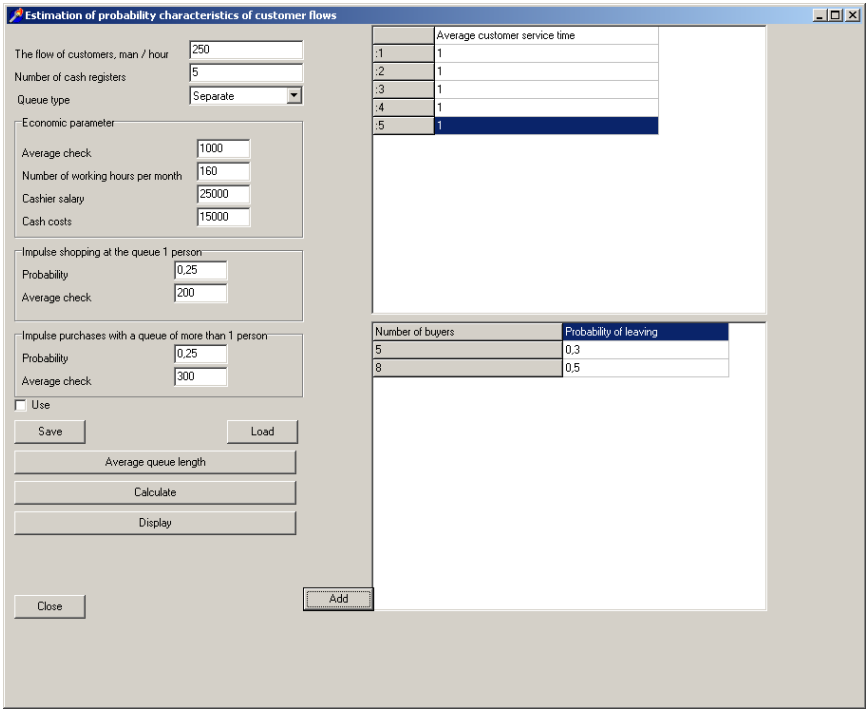


Figure 1. – Entering Input Data

The most basic concept is the calculation of the average line length and the average waiting time in the line (Figure 2).

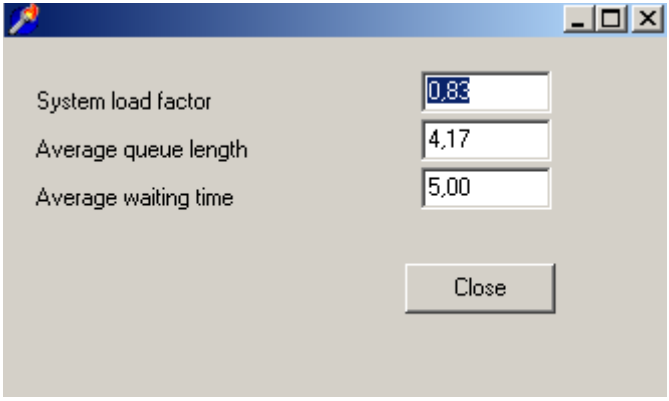


Figure 2. – Average Line Length and Average Waiting Time in the Line

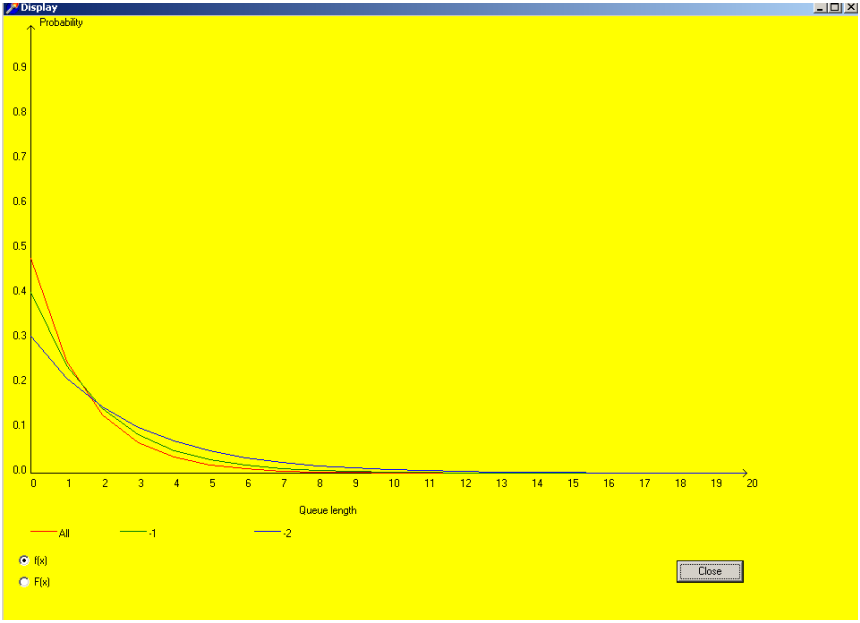


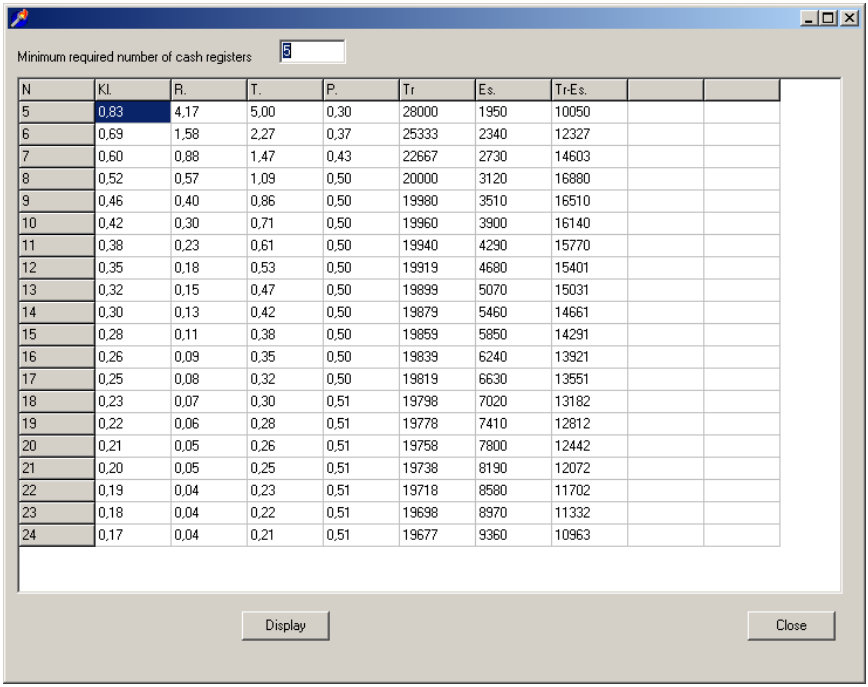
Figure 3. – Probabilistic Rules of Line Length Distribution

However, the use of average parameters does not allow making a conclusion on the efficiency of organizing the lines.

In this regard, the program shows a chart characterizing the probabilistic rules of the line length distribution (Figure 3).

The main objective of a retail organization is profit. In this regard, it is possible to display main business parameters depending on the number of cash registers. Such parameters are the load factor of cash registers, average line length, average waiting time in the line, probability of customers' leaving without a purchase, turnover, cash register expenses, and turnover net of cash register expenses.

In this regard, the optimal number of cash registers is primarily determined on the basis of the ratio of turnover and cash register expenses, including the cashier's salary (Figure 4).



N	Kl.	R.	T.	P.	Tr	Es.	Tr-Es.
5	0,83	4,17	5,00	0,30	28000	1950	10050
6	0,69	1,58	2,27	0,37	25333	2340	12327
7	0,60	0,88	1,47	0,43	22667	2730	14603
8	0,52	0,57	1,09	0,50	20000	3120	16880
9	0,46	0,40	0,86	0,50	19980	3510	16510
10	0,42	0,30	0,71	0,50	19960	3900	16140
11	0,38	0,23	0,61	0,50	19940	4290	15770
12	0,35	0,18	0,53	0,50	19919	4680	15401
13	0,32	0,15	0,47	0,50	19899	5070	15031
14	0,30	0,13	0,42	0,50	19879	5460	14661
15	0,28	0,11	0,38	0,50	19859	5850	14291
16	0,26	0,09	0,35	0,50	19839	6240	13921
17	0,25	0,08	0,32	0,50	19819	6630	13551
18	0,23	0,07	0,30	0,51	19798	7020	13182
19	0,22	0,06	0,28	0,51	19778	7410	12812
20	0,21	0,05	0,26	0,51	19758	7800	12442
21	0,20	0,05	0,25	0,51	19738	8190	12072
22	0,19	0,04	0,23	0,51	19718	8580	11702
23	0,18	0,04	0,22	0,51	19698	8970	11332
24	0,17	0,04	0,21	0,51	19677	9360	10963

Figure 4.– Ratio of Turnover and Cash Register Expenses

It is also possible to display a graph of the dependence of turnover net of cash register expenses on the number of cash registers. Figure 5 shows a graphic representation of this dependence.

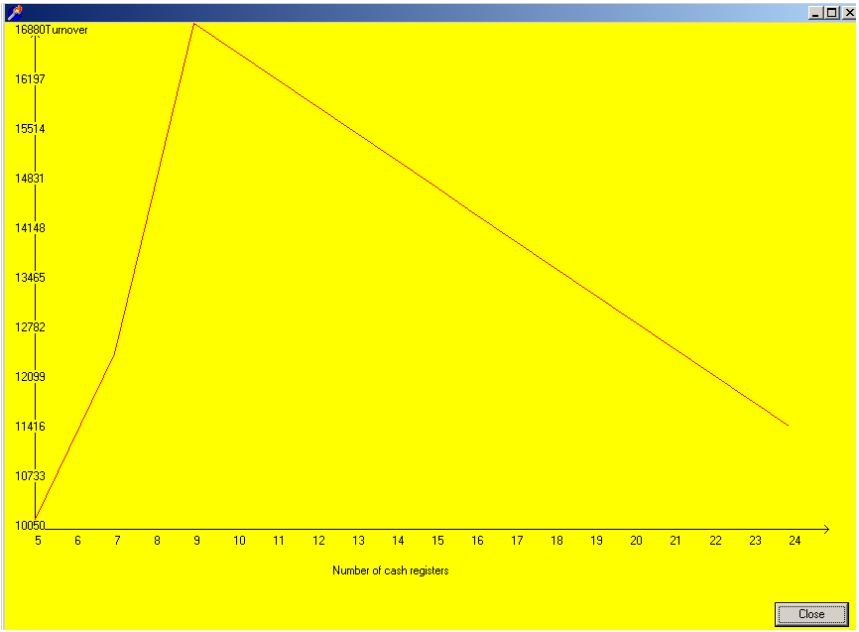


Figure 5. – Graph of Turnover Net of Cash Register Expenses Dependence

The above allows making a conclusion on the optimal number of cash registers of a retail organization.

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