**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE**

**DMYTRO MOTORNYI TAVRIA STATE AGROTECHNOLOGICAL UNIVERSITY**

**Business and Economics Faculty**

**Marketing Department**

**DESIGN THINKING**

LECTURE NOTES

for the Master Degree applicants

on the ***075 Marketing*** Speciality

The Design Thinking Lecture Notes were developed in the framework of ERASMUS+ CBHE project “Digitalization of economic as an element of sustainable development of Ukraine and Tajikistan” / DigEco 618270-EPP-1-2020-1-LT-EPPKA2-CBHE-JP

**Melitopol, 2022**

 **Design Thinking**. Lecture Notes for the Master Degree applicants on 075 Marketing Speciality. Melitopol, TSATU, 2022. 41 p.

The Lecture Notes were approved and recommended to publishing on the session of the Marketing Department

Protocol No *\_\_\_\_* dated \_\_\_\_\_\_\_\_\_\_20\_\_

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**INTRODUCTION**

Operating in a competitive environment requires business representatives to implement innovative approaches and technologies of doing business, meet the needs of key consumers based on a detailed study of their needs and individual needs, the formation of original marketing strategies and market specific needs of certain populations. Understanding by modern marketers of the use of such an effective method of generating innovative ways to solve marketing problems, as design thinking, is aimed at forming knowledge, skills and abilities to find ways to creatively solve applied problems in group work within the team.

Design thinking, a method of creative and collaborative problem solving originating in the tactics of designers, is a product design and development process that is, more and more, being used as a tool to move innovation forward and structure creation processes. By embedding learning and reflective practices into the structure of design thinking, a hybrid model emerges that is a more effective tool for framing and solving these types of problems within teams.

Design thinking as a method of creative joint solution of existing problems is a process of product design and development and is increasingly used as a tool to promote innovation and structure product development processes. The harmonious combination of learning and reflective practices in the structure of design thinking forms a hybrid model which is the most effective tool for creating and solving problems of teamwork on the collective creation of innovations.

*The purpose of the course* is to master the theoretical knowledge and practical skills needed to identify existing problems of potential customers and generate innovative ways to solve them.

*Course objectives* include formation of a systematic approach to design thinking; strengthening the skills of creative thinking in solving problems; strengthening the skills of teamwork in the search for innovative ways to solve existing problems; mastering the methods of generating innovative approaches to solving the existing problem.

The lecture notes are developed on the basis of the approved syllabus (work program) of the course in accordance with the standard of higher education of Ukraine in the specialty. It covers 5 topics, combined into 2 content modules and a list of recommended resources.

**COURSE STRUCTURE**

| **Week number** | **Types of lessons** | **Course content and tasks for individual work** | **Amount** |
| --- | --- | --- | --- |
| **hours** | **grade** |
| **lec** | **lab** | **pract** | **ind** |
| **Module 1. *Methods of problem diagnostics*** |
| 1-2 | Lecture 1 | Design thinking approach: principles and process. Empathy: understanding human needs and hardships | 2 | - | - | - | - |
| Practical 1 | Design thinking approach: principles and process. Empathy: understanding human needs and hardships | - | - | 4 | - | 5 |
| Individual work  | Online activities from the university e-learning course | - | - | - | 15 | 4 |
| 3-4 | Lecture 2 | Identifying the problem: reformulation and defining the problem in human-oriented ways | 2 | - | - | - | - |
| Practical 2 | Identifying the problem: reformulation and defining the problem in human-oriented ways | - | - | 4 | - | 5 |
| Individual work | Online activities from the university e-learning coursePresentation development | - | - | - | 15 | 3 |
| 5-6 | Lecture 3 | Generating ideas: techniques and tools for creating the concept of solutions | 2 | - | - | - | - |
| Practical 3 | Generating ideas: techniques and tools for creating the concept of solutions | - | - | 4 | - | 5 |
| Individual work | Online activities from the university e-learning coursePresentation development | - | - | - | 14 | 3 |
| ***Total for Module 1 – 62 hours*** | **6** |  | **12** | **44** | **25** |
| ***Final module test 1*** |  |  |  |  | **10** |
| 9-10 | Lecture 4 | Prototyping: application of a practical approach to modeling ideas | 2 | - | - | - | - |
| Practical 4 | Prototyping: application of a practical approach to modeling ideas | - | - | 6 | - | 7 |
| Individual work | Online activities from the university e-learning coursePresentation development | - | - | - | 20 | 5 |
| 11-13 | Lecture 5 | Testing: developing a prototype of the variant of solving the problem and estimating the obtained results | 4 | - | - | - | - |
| Practical 5 | Testing: developing a prototype of the variant of solving the problem and estimating the obtained results | - | - | 10 | - | 8 |
| Individual work | Online activities from the university e-learning coursePresentation development | - | - | - | 22 | 5 |
| ***Total for Module 2 – 58 hours*** | **6** |  | **10** | **42** | **25** |
| ***Final module test 2*** |  |  |  |  | **10** |
| ***Exam*** |  |  |  |  | **30** |
| ***Total for the course – 120 hours*** | **12** |  | **22** | **86** | **100** |

**MODULE 1. *METHODS OF PROBLEM DIAGNOSTICS***

**TOPIC 1**

**DESIGN THINKING APPROACH: PRINCIPLES AND PROCESS. EMPATHY: UNDERSTANDING HUMAN NEEDS AND HARDSHIPS**

***Goal:***to find out the essence and specifics of design thinking in the system of modern methods of innovation.

***Plan:***

* 1. The essence, characteristics and categories of design thinking.
	2. Characteristics of the design thinking process and the main stages.
	3. Methodological principles of the study of human empathy.

***References:*** [1,3,4,5,6,7, 8,13,15,17].

* 1. **The essence, characteristics and categories of design thinking.**

From large private companies to small NGOs, to academic institutions, to government entities, all are striving to learn about and create innovative services, products, and experiences that address the problems the relevant stakeholders in their industries face. Design thinking, a methodology for problem solving that has its origins in designers’ approaches, tactics, and needs to make this multi-disciplinary process explicit (Gregory, 1966), has increasingly emerged in recent decades as a powerful method to drive the innovation process in the pursuit of improvement. Design thinking, as described by the emerging management and innovation scholar Michael Luchs (2015) is “a creative problem-solving approach – or, more completely, as a systematic and collaborative approach for identifying and creatively solving problems” (p. 1).

Large enterprises and corporations, representatives of private small and medium-sized businesses, academic and governmental institutions and organizations face the need to create innovative products and services to meet existing stakeholders in the relevant field. The key to the successful implementation of innovations is a qualitative justification of the chosen strategy and an effective system of control over its implementation.

The methodology of design thinking is based on interdisciplinary approaches to stimulate innovation processes aimed at improving existing products, services and processes. According to scientist Michael Luchs (2015), design thinking is a systematized method of collective work on identifying and creatively solving a problem.

Design thinking’s holistic approach to stakeholders and systems, coupled with its participatory nature, has made it an approachable technique to use beyond the fields of art, architecture, engineering, and technology that traditionally have design disciplines. The theories and practice of design thinking have grown in popularity and have been more heavily used in the academic discourses on management and in the business industry over the past several decades.

An integrated approach to design thinking as a tool for finding ways to satisfy stakeholders on the basis of involvement can expand the application of tactics used in the fields of art, architecture, engineering and technology, which are characterized by the use of design methods. Theories and practices of design thinking are gaining popularity and are increasingly used in the academic field of management and business administration over the past few decades.

The most complex, multifaceted, and intractable problems with systemic impact are referred to as wicked problems (Roberts, 2000; Churchman, 1967; Rittel & Webber, 1973). Organizations: This term is defined as “social units (or human groupings) deliberately constructed and reconstructed to seek specific goals” (Etzioni, 1964, p. 3) and, in this study, they are defined as seeking to solve problems through the creation of a new product or service. Design thinking: The definition of design thinking in this study can be simply understood as the use of methods and research practices to solve problems that are traditionally not found in the fields of design, architecture, or engineering.

*The goal of design thinking*is to solve the most complex, multifaceted, and unresolved problems with systemic influence (Roberts, 2000; Churchman, 1967; Rittel & Webber, 1973).

Organizations in this context act as social units or a group of individuals, which is created purposefully to achieve specific goals, in order to solve the problem by creating a new product or service (Etzioni, 1964, p. 3).

Design thinking is seen as the use of methods and research practices to solve problems outside of design, architecture or engineering. **Design thinking** is a method of developing products, services, services focused on the consumer (user), which is based primarily on the focus on consumer demand, and secondly - the possibilities of technical implementation and economic opportunities.

Characteristic features of design thinking are:

* immersion in the consumer experience;
* delayed departure to identify the problem;
* focusing on personal scenarios of behaviour and actions.

In order to solve the problem and determine an effective solution, it is necessary to conduct research, focus on the "pain points" of stakeholders, generate an alternative set of ideas, choose the best alternative, create a prototype and test it. The method of design thinking describes the tactics of these stages and the tools needed for each of them.

Hasso Plattner and David Kelly, the founders of the Hasso Plattner Institute of Design (a design school that combines management and business practices with traditional engineering techniques), systematized design thinking techniques. They explored the stages of the creative process, at the centre of which is the consumer, and substantiated approaches to the use of design thinking in business.

In 1969, Herbert Simon, in his book Sciences of the Artificial, defined design as the process of making existing conditions desirable. Thus, design thinking is a process that is always focused on creating a better future and finding new tools for solving complex problems in a variety of areas targeted at the target group of users.

Since the 1990s, thousands of people have studied design thinking individually and in groups. Among the prominent pioneers in this field are the design consulting firm IDEO and the Hasso Plattner Institute of Design at Stanford University. Design thinking was depicted in different schemes: as an open spiral, a curved loop, a double rhombus or a series of rings. No matter what diagram to describe this process, in the methodologies of design thinking we constantly come across two central ideas or principles.

There was a certain development of the theory and practice of design thinking, given in the form of chronology in the table 1.

*Table 1*

*Chronology of development of theory and practice of design thinking*

| ***Period*** | ***Characteristics*** |
| --- | --- |
| Till 1960s | The origins of design thinking partly lie in the process of creative techniques of the 1950s. |
|  | The first known books on creative methods were published by William J. J. Gordon (1961) and Alex Fakeney Osborne (1963).The 1962 Conference on Systematic and Intuitive Methods in Mechanical Engineering, Industrial Design, Architecture, and Communications, London, UK, aroused interest in studying design processes and developing new design methods.Books on design methods and theories in various fields have been published by Maurice Asimow (1962) (engineering), Christopher Alexander (1964) (architecture), L. Bruce Archer (1965) (industrial design) and John Chris Jones (1970) (product and system). design) |
| 1970s | In their book The Universal Traveler, Don Koberg and Jim Bagnall were the first to develop "soft systems" for solving the problems of "everyday life."Horst Rittel and Melvin Webber publish "Dilemmas in General Planning Theory", which show that the problems of design and planning - evil problems, in contrast to the "manual", individual disciplinary problems of science.L. Bruce Archer expands the study of design ways of cognition, arguing: "There is a design way of thinking and communicating that differs from scientific and scientific methods of thinking and communicating and is as powerful as scientific and scientific research methods when applied to its own kinds of problems. |
| 1980s | Development of human-oriented design and growth of design-oriented business management.Donald Shen publishes "Reflexive Practitioner", in which he seeks to establish the epistemology of practice embedded in artistic, intuitive processes that [design and other] practices bring in situations of uncertainty, instability, uniqueness, and conflict of values. |
| 1990s | The first symposium on research in the field of design thinking was held at Delft University, the Netherlands, in 1991.IDEO design consulting agency was formed by combining three industrial designs of the company. They are one of the first design companies to demonstrate their design process based on design methods and design thinking. |
| 2000s | The beginning of the 21st century. brings a significant increase in interest in design thinking as the term becomes popular in the business press. Books on how to create a more design-oriented workplace where innovation can thrive have been written for the business sector, including Richard Florida (2002), Daniel Stusan (2006), Roger Martin (2007), Tim Brown (2009), Thomas Lockwood (2010), Vijay Kumar (2012).The design approach is also being expanded and adapted to address service design issues, marking the beginning of the service design movement.In 2005, Stanford University d.school began teaching design thinking as a universal approach to technical and social innovation. |
| 2010s | In the Harvard Business Review, Jeanne Lidtke claims that "design thinking" works in business (2018). |

Design thinking has certain characteristics. First, design thinking is human-centered. First of all, it takes into account the needs and desires of people, not the proposals of companies or artistic ideas. Human-centered design thinking involves observation, conversation, research, and collaboration.

Second, design thinking is based on a creative worldview, openly exploring certain issues, rather than looking for a specific path to these results. During this creative process, you need to ask questions, visualize ideas, create material prototypes and tell stories about people, ideas and results.

These key principles — human-centeredness and a creative worldview — support a vibrant and changing process of design thinking.

Each stage of the design thinking process is characterized by two phases:

- divergent thinking;

- convergent processing.

The divergent phase (from the Latin *divergere* means to diverge) is to find many solutions to the same problem.

The convergent phase (from the Latin *convergere* is to converge) is the exact use of instructions for solving the problem.

* 1. **Characteristics of the design thinking process and the main stages.**

Innovation, described as the “core renewal process” in an organization purposed with creating new products and services (Bessant, Lamming, Noke, & Phillips, 2005), is the mechanism for addressing wicked problems. In order to innovate effectively to remain competitive, organizations have increasingly turned to the application of design thinking as a process for product development in recent decades (Lockwood, 2010; Johansson-Sköldberg et al., 2013). Design thinking-driven problem solving is a powerful and disruptive method that creates innovative products and services that seek to address these types of problems across diverse fields. As stated by Sydney Gregory in the seminal work The Design Method (1966), “[the] design method is a pattern of behaviour employed in inventing things...which do not yet exist. Science is analytic; design is constructive” (p. 6). Design, in this context, is used as an engine of product, system, and service creation that addresses the client’s or end-user’s needs and challenges.

Innovation is seen as the embodiment of a process that needs to be renewed in the organization and is designed to create new products and services (Bessant, Lamming, Noke, & Phillips, 2005), is a mechanism for solving key problems. In order to effectively innovate and strengthen competitiveness, organizations in recent decades have increasingly resorted to the use of design thinking as a product development process (Lockwood, 2010; Johansson-Sköldberg et al., 2013). Design problem solving is a powerful method of creating innovative products and services that can solve existing problems in various industries.

Sidney Gregory in The Design Method (1966) stated that design thinking is “a method of designing a pattern of behaviour that is used to create things that do not yet exist. Science is analytical, and design is constructive. ” In this context, design is used as the engine of a product, system, service creation that meets the needs and challenges of the customer or end user.

The idea of a foundational, practice-driven design thinking method is one that can firmly be embedded in the second-generation design theory mentioned previously, yet is able to adapt to evolving social science research, diverse populations, and changing trends.

Tim Brown’s design thinking definition of three overlapping, sometimes non-sequential elements—inspiration, ideation, and implementation—as outlined in Change by Design (2009) and popularized by IDEO, will serve as the foundation for the proposed method in this study. This definition of design thinking is informed by the work of Lawson (1980), Rowe (1987), Archer (1979), and Cross (1991, 2001). This foundational design method is broadly defined as the three key elements can be repeated, can overlap, and can be nonsequential (Brown & Wyatt, 2010).

The idea of a fundamental, practice-oriented method of design thinking is the possibility of adapting existing experience in solving the problem considering the achievements of socio-scientific research, various groups and existing trends.

Tim Brown defines the process of design thinking on the basis of three elements that are not consistent but intersect: inspiration, idea and realization. He noted this position in his work "Changed by design" (2009). This definition of design thinking is based on the work of Lawson (1980), Rowe (1987), Archer (1979) and Cross (1991, 2001). This design approach identifies three key elements that may be repetitive, overlapping, and inconsistent (Brown & Wyatt, 2010):

* inspiration;
* idea;
* implementation.

The first key element is the creation of ideas with participation from and empathy on the part of the designer for relevant stakeholders. This empathetic process can elucidate what stakeholders are relevant, which are not mentioned, and what system dynamics are involved. Furthermore, collaboration with stakeholders in the system in particular ways, regardless if they are the enduser, results in more innovative results (Holmlid, 2009, p.7). This element is similar to a needfinding exercise (Faste, 1987), in which the designer learns the wants and needs, explicit and implicit, of the client and creates a custom solution that addresses these requests. The needfinding exercise is present throughout the design process; however, in the inspiration portion of the IDEO process (Brown, 2009; IDEO, 2011), it is a central feature that allows ideas, solutions, and approaches to the client’s problem to first take shape.

The first key element is the creation of ideas with the participation and empathy of the designers for the relevant stakeholders. This empathic process can find out which stakeholders are relevant, which are not mentioned, and which system dynamics are involved. In addition, interaction with stakeholders (regardless of whether they are the end user) leads to more innovative results (Holmlid, 2009, p.7). This element aims to determine the need (Faste, 1987), in which the designer studies the explicit and implicit desires and requests of the client, creates a custom solution that meets these requests. File search exercise is required throughout the design process; however, in terms of inspiring the IDEO process (Brown, 2009; IDEO, 2011), it is a central feature that allows you to create ideas, solutions and approaches to solving a client's problem.

The second key element is some form of prototyping, iteration, and validation. This can be described as a period of rapid, incremental experimentation of ideas that can be quickly tested and analysed. These exercises can be described as ideation (Brown, 2009), with a clear emphasis on turning the ideas into concrete products, services, or systems. The ideation step in design thinking can be repeated infinitum, as ideas are repeatedly thought of and made physical in some form in order to test and evaluate them for the proposed purpose.

The second key element is some form of prototyping, iteration and verification. This can be described as a period of rapid, gradual testing of ideas that can be quickly tested and analysed. This element can be described as reasoning (Brown, 2009), with a clear emphasis on transforming ideas into specific products, services, or systems. The stage of an idea in design thinking can be repeated indefinitely, as ideas are repeatedly comprehended and transformed physically in various forms to test and evaluate their compliance with the desired goal.

The third element is implementation, which is also reflective and iterative. Implicit in the design thinking process, it is an element of learning from each idea, experimenting, and validating the idea’s success or failure in order to build on and create a better, more refined product or service. This process of learning from past experiences can be described as reflective practice (Schön, 1988) and is the driver of the design thinking process. Reflective practice (Schön, 1988, 1983) connects the inspiration, ideation, and implementation elements (Brown, 2009) of design thinking within the context of the needs of the stakeholder, with an emphasis on reflection, improvement, and empathy.

At the heart of design thinking is the search for ideas. Creative methods in design play the role of a set of specific actions performed by the team to find an idea.

The Stanford School of Design divided the process of design thinking into several stages (Fig. 1):

1. Empathy is immersion in the problem and user experience.

2. Focusing includes the formulation of a specific, significant task that can be solved.

3. Generation of ideas means invention of ideas and choosing a solution.

4. Prototyping is creating a model for testing certain solutions;

5. Testing enables getting feedback and determining the best solution.



Fig. 1. Design thinking algorithm

The presented method of design thinking consists of five stages, each of which belongs to the divergent or convergent phase. Divergence is to expand the angle of view, collecting all the findings and ideas. Convergence involves narrowing the focus and selecting a priority idea to be tested in the next steps.

The process of design thinking is iterative, i.e. the developed idea is immediately subject to verification, the result is used as an experience to find a better solution.

* 1. **Methodological principles of the study of human empathy.**

Empathy is at the heart of user-centred design. **Empathy** is the ability to imagine oneself in the place of another person, the ability to empathize.

Empathy helps to immerse oneself in the problem through observation. Observing people makes it possible to develop the products or services that these categories of stakeholders need. Observations are an occasion to analyse what people think and feel. Observations help determine needs. Successful design is always based on a deep understanding of the worldview of consumers, and empathy allows you to look at the projected task on their part.

Empathy provides an opportunity to study the behaviour of the target audience in the context of a specific goal. The designer needs to understand what is important to certain consumers, how they perceive the world, what they need emotionally and physically, why they behave in one way or another.

One of the most effective tools for understanding what a consumer feels is to map empathy. It allows you to systematize all the observations obtained, to compile interesting (and sometimes even unexpected) results that can turn into insights.

The term *insight* (penetration into the essence) was introduced in 1925 by the American psychologist Wolfgang Keller. It means a sudden solution to a problem situation. The specificity of insight is that the solution of the problem occurs as a sudden enlightenment - by understanding the situation as a whole, and not as a result of analysis or reflection.

The map of empathy is a graphic scheme in the centre of which the consumer who is surrounded by various information blocks depending on the task is located. The main task of compiling a map of empathy is to create a detailed portrait of the ideal consumer of a particular product.

***Self-reflection***

1. Explain what is the essence of design thinking?
2. Describe the main purpose of the application of design thinking.
3. What are the key features of design thinking?
4. What is the essence of the divergent phase of design thinking?
5. What is the essence of the convergent phase of design thinking?
6. How are elements such as inspiration, idea, realization related?
7. What stages of the process of design thinking are identified by experts?
8. What is the essence of empathy in the process of design thinking?
9. What is the purpose of creating empathy cards?
10. Explain the meaning of "insight"

**TOPIC 2**

**IDENTIFYING THE PROBLEM: REFORMULATION AND DEFINING THE PROBLEM IN HUMAN-ORIENTED WAYS**

***Goal:*** to find out the directions and tools for identifying problems in human-oriented ways.

***Plan:***

2.1. Analysis of consumer behavior in order to identify problems, new needs and benefits.

2.2. Tools for describing and analyzing consumer behavior.

***References:***[1,2,3,5,6,7,10,13,18].

**2.1. Analysis of consumer behavior in order to identify problems, new needs and benefits.**

Empathy involves the study of the initial problem through immersion in the natural environment in which a person is, in order to understand his motives, emotional state, physical limitations and other components of "experience". The task of the researcher is to put himself in the place of the object of study.

Empathy is manifested in trying on the experience of another person: "I would be in your place ...", "If I were you ..." A person tries to be "in the body" of another, to understand how he would behave in certain circumstances and under certain views of the world. This is an example of empathy. Empathy - understanding the relationships, feelings, mental states of another person in the form of empathy.

Analysis of consumer behavior is an important starting point for identifying problems, needs and benefits of innovative products (services) and involves the use of qualitative and quantitative methods.

Qualitative research methods are aimed at understanding the causes and motives of consumer behavior, their thoughts, desires, values, views, concerns and interests. They are aimed at a deeper understanding of consumer behavior without the use of statistics. Qualitative methods include focus groups, in-depth interviews, and projection methods.

A focus group is an interview that takes the form of an informal conversation in which a group of participants discusses a topic of interest to the researcher. Focus group is usually used to study the consumer's vocabulary, their views and attitudes to the product or service, emotional and behavioral reactions, to understand consumer demands, perceptions, feelings, beliefs and ideas about the brand, product or service, and to explain the collected quantitative data method. This method allows participants to interact and influence each other, which generates more data and provides a more natural environment for participants.

An in-depth interview is a personal interview conducted according to a predetermined plan and based on techniques that encourage respondents to think long-term about the area of research needed by the researcher. This method makes it possible to determine the most important properties of the product for the consumer, to study the deep motives of choice, to assess the image of the brand, to test the concept of a new product, promotional materials, packaging design and more.

The projection method of researching consumer behavior is carried out in the form of an unstructured survey using ambiguous, vague questions. The difference between this method is that respondents are asked to explain other people's behavior, not their own. In trying to do so, they involuntarily express their hidden motives, beliefs, attitudes, feelings, and moods about a particular problem. The main projection methods of marketing research include associative methods, methods of ending the situation, methods of constructing the situation, expressive methods.

The associative method involves identifying the objects with which the product, brand, brand is associated. During the survey, respondents are shown an object, and then asked to say about it what first came to mind. This method allows respondents to express their thoughts, inner feelings, emotions on the research topic. The most famous method is verbal associations, when the proposed words need to choose the words with which the respondent associates them in the first place.

In the methods of ending the situation, the respondent must complete a certain invented situation, story or sentence on the research topic, using words and phrases that first came to mind. This method, in contrast to the verbal association, allows you to get more information about the emotions of the respondents.

Methods of constructing a situation are closely related to methods of completion, but here the researcher gives the respondent less initial data and requires a more detailed answer. When using this projection method, the respondent invents stories, dialogue or describes certain situations. There are two main methods of constructing a situation: a picture response, when the respondent is shown a picture and asked to tell the story it describes, and animated tests, in which the respondent is asked to come up with an answer to a cartoon character's comment in different situations.

In the expressive method, the respondent's task is to convey emotions, feelings, and thoughts of people in the situation offered by the researcher orally or visually from a third person. The main expressive methods are role-playing and the third-person method. In role-playing, respondents are asked to be in the role of another person and imagine how she will behave in a given situation, but guided by their own feelings and emotions.

Quantitative methods of marketing research are aimed at obtaining accurate data on consumers, expressed in absolute or relative terms, using statistical analysis procedures. These studies are used to identify key market segments, to create a portrait of the target audience, to determine consumers' willingness to buy a product or service, to identify priority product criteria, to assess the compliance of an existing product with market requirements, to measure brand awareness and to rank consumer preferences. Quantitative methods allow to check the validity of consumer opinions identified in the course of qualitative research. The main methods of quantitative research include: survey, observation, experiment.

Observation involves the collection of primary information by monitoring selected groups of people, events, phenomena, situations. It may occur with or without the participation of an observer. In the process of research, the registration of facts, patterns of behavior of people and objects, options for the development of events. With this method you can understand the characteristics of consumer behavior in the future (the process of forming motivation to buy, choosing a product or service, place of purchase). Methods of observation can be classified according to the method of their implementation: personal observation, observation with the use of technical means; audit of consumer stocks, content analysis, trace analysis.

Surveys are a method of gathering primary marketing information through a structured questionnaire or interview. In this case, the researcher in writing or orally addresses a certain group of people (respondents) with questions, the content of which reflects the research problem. It can be conducted in person, by mail, electronically or by telephone. The questionnaire process includes registration, statistical processing and interpretation of the received answers. The survey method involves in-depth study of motivations, desires and intentions of consumers, their buying behavior, awareness, lifestyle, socio-demographic characteristics, as well as identifying factors influencing their behavior.

An experiment is a method for establishing cause-and-effect relationships and identifying the deep motives of consumers.

An important condition for marketing research of consumer behavior is the complementarity of qualitative and quantitative methods, because the combination of their results provides sound recommendations for decision-making.

One of the methods of studying consumer motives in design thinking is consumer ethnography.

Ethnography is a qualitative method of research characterized by spending long periods of time with people. This method involves seeing data about what and how consumers do. Ethnographic work helps to learn about cultural practices and identify the hidden needs of consumers, which allows you to identify the factors that are most important to consumers, establishing who they are, how they live and what governs their behavior. Knowing the consumer's life based on the creation of their own experience, fixing their behavior allows you to create deeper and more convincing results compared to traditional research methods, and help to distinguish the "true image of the consumer" from the "imaginary".

The main value of using the ethnographic method in research is the focus not on the results obtained by using "dry" mathematical formulas, but on the data of real consumer behavior: every day, in any situation and environment, in the store or at home, and most importantly - in the natural environment. . That is, the range of issues covered is much wider and more reliable. Ethnography is a set of methods aimed at "fixing" the real behavior of people with their subsequent interpretation. As a rule, ethnographic research involves the observation of informants in different situations (shopping, handling of goods, communication, recreation, and so on). Either the researcher himself or a camera installed in the right place can observe.

American anthropologists have been studying modern consumers since the 1980s. Corporations such as Intel, IBM, Apple Computers, Pizza Hut, GM, Motorola, use business anthropology in developing marketing strategies, creating and improving products.

*Advantages of ethnographic research in marketing*. Explaining the cultural and emotional significance of a product, concept, service, action or corporate image, allows you to correctly predict the actions and reactions of people. The purpose of ethnographic marketing is to ensure that consumers use products in terms of their actual, daily use in everyday life.

First, ethnographic marketing can provide greater intimacy and emotional intimacy with respondents.

Second, ethnographic marketing makes it possible to analyze the general significance of the culture in which consumer behavior is formed.

Third, ethnographic marketing makes it possible to achieve deep motives of consumers, often unconscious, regarding certain products.

1. **Emotional rapprochement**. The peculiarity of ethnographic marketing is to be in close proximity to people when the use of a product is important. At this point, the manufacturer enters the personal environment of the consumer and automatically becomes an accomplice.

2. **Cultural aspect**. Culture consists of many elements; knowledge of people, their growth and development in a society. Culture gives us guidelines for interpreting the world around us. To really explore and study the meaning of consumer action, you need to understand in detail the culture in which the consumer is. Today, given the globalization of peoples and cultures, the world is increasingly moving and in contact. Meanwhile, new values, new life forms, are constantly emerging and spreading rapidly.

**2.2. Tools for describing and analyzing consumer behaviour.**

Empathy maps are a form for collecting observations of people's behavior and analyzing in-depth interviews.

There are no universal maps of empathy. In practice, they use different templates, options for filling in empathy maps and tools for creating them.

The main task of the empathy map is to make a detailed portrait of the ideal consumer for a particular product. The answers to these questions determine the needs of the user. His actions and desires are expressed by a verb. The empathy map reproduces all the information that was collected in the empathy mode. Such materials can be video, audio, recordings, etc.

The scope of practical application of the empathy map as a means of visualizing ideas is very wide: from the analysis of the target audience to the development of advertising strategy when launching a new product or conducting an interview.

All received information is systematized in the form of blocks depending on the questions to which the answer was received. Analytical services can also be sources of information on consumer behavior: Google Analytics, built-in analytics Facebook Audience Insights and other special features.

It is expedient to record all types of research with the help of photography, video and voice recording in order to return to certain issues if necessary and to clarify controversial points that have fallen out of the researcher's field of vision. Observing people, the researcher will get more information about the actions of consumers, their interaction with the outside world, which will identify areas of interaction with humans and create innovative solutions.

Under the customer profile (customer profiling) is a detailed description of the target audience for which they create an innovative product (service).

The consumer profile provides specific tools to:

* develop a clear argument;
* find the right form of information;
* determine the time and place of advertising.

The main tools of design thinking are:

* visualization - active use of figurative description of certain ideas;
* mapping of the "user's journey", ie the study of ways of interaction between the client and the company to determine its explicit and implicit needs;
* value chain analysis - identifying the competitive advantages of new proposals to determine ways to develop, promote and disseminate them;
* mapping of thoughts - visual display of interrelations of the basic and auxiliary ideas on design of the goods for their generation and classification;
* rapid development of concepts to generate hypotheses about new opportunities for business ideas;
* testing of proposals - identification of attractive aspects of the project, as well as testing of new concepts in theory and practice on tests of value creation, implementation, scope and suitability;
* prototyping of product models - creation of storyboards, custom scripts, CJM ("customer travel cards"), illustrations of business concepts to encourage potential users of the product for feedback;
* co-creation with the client - involvement of clients in development and testing of new ideas on creation of new products with high value;
* story telling - the technology of creating stories aimed at advertising the product, and to convey ideas about it to the audience through sites, chatbots, e-mail - newsletters, online and offline performances and other ways.

Creating a map of empathy involves identifying key blocks of answers to the questions listed in the table 2.

*Table 2*

*Obtaining information to create a map of empathy*

| ***Sector name*** | ***Possible questions*** | ***Ways to find information*** |
| --- | --- | --- |
| PHOTO AND USERNAME | What is the consumer's name?What does the consumer look like? | photos from social networks or from open sources of information |
| THINK AND FEEL | What does a person know about goods (services), problems ("product")?How does he feel emotionally about the product?What are expressed and unspoken desires related to the product?What words and deeds really affect a person and leave a mark in his memory?In what emotional mood is a person most of the time?What is important for the user?What occupies his / her thoughts?What worries burden him / her?What solutions does the consumer like?How does he describe the problem? | from forums, social networks, communities |
| HEAR | Who is the authority that influences a person's opinion (parents, spouse, colleagues, neighbours)?To what extent is a person subject to the influence of authority?What media consciously or subconsciously influence him?What does he hear every day?What do people around say about the problem?What solutions do users offer? | from forums, social networks, closed professional communities, comments under publications in specified editions |
| SEE | In what environment does a person live?What information about the product comes to it from external sources?What are the problems associated with the product in his life?What competing offers does he see?What solutions to the problem does the user face?How is information presented about alternative solutions?Does the user use other solutions?Who does he / she see as competitors? | from sites and advertising materials of competitorsfrom articles and reviews of profile mediafrom the Internet |
| SAY AND DO | What is his / her attitude towards other products?What does he / she do in public?What actions does he take to solve the problem?Public consumer statements about the product (quotes)?Sources and methods of finding product information?Attitudes towards people who have already bought the product?Perception of a person with others, with whom he communicates about the product? | from articles and reviews of specialized media from the Internet from social networks, professional communities |
| PAIN | What failures and disappointments did you face?Topics that cause discomfort?Existing fears, anxieties, anxieties that may be the reason for the consumer's refusal to purchase the product?What risk does he take to get what he wants?What fears, failures and obstacles does he / she face?What is the user afraid of?What prevents the user from using your solution? | from articles and reviews in specialized media from the Internet. from social networks, professional communitiesfrom conclusions on the block: "What do you think? What does it feel like? » |
| GAIN(Winning, values, successes, aspirations) | What goal does a person strive for and what does he want to achieve as a result?By what criteria does he evaluate success?What methods does he use when going to the planned goal?What in the product may interest the consumer as a tool to achieve this goal?What does he / she hope for?What does the user need to get rid of the problems?What values are important to him? | from forums, social networks, communities |

The correct idea of the target audience helps to adequately position the new product, competently conduct its advertising campaign, and thus increase sales. The "see" and "hear" blocks allow you to determine the optimal channels for the dissemination of information about products. Particular attention is paid to the last two blocks of the empathy card: the presentation of the proposal should dispel all doubts and anxieties contained in the block "pain points" and emphasize the ability of this product (service) to help achieve the goals of the block "success and aspiration". It is important to pay attention to the possible conflict between what a person "says and does" in public and how he "thinks and feels" in reality. Empathy map analysis allows you to determine what the product does not meet the requirements or expectations of the target audience and how to correct this shortcoming (Fig. 2).



Fig. 2. Example and illustration of an empathy card

Source: https://boagworld.com/usability/adapting-empathy-maps-for-ux-design/

The empathy card can contain the following blocks:

1. Quotes and keywords (3-5 points about significant things that the interlocutor said);

2. Actions and behavior (user behavior, both in general and in this case);

3. Thoughts (quotes from what the user thinks);

4. Feelings and emotions (emotional state of the user).

Empathy cards allow designers to understand the elusive meaning of the user experience to discover ideas.

In order to create a map of empathy, information technologies are widely used, which serve as interactive means of generalization and visualization of the data obtained during the study.

***Self-reflection***

1. Explain what is the essence of empathy?

2. What methods of analysis of consumer behaviour are used at the stage of empathy in design thinking?

3. Explain what is the meaning of the concept of ethnography as a qualitative method of consumer research?

4. What is the task of creating a map of empathy?

5. Explain the meaning of the concept of consumer profile.

**TOPIC 3**

**GENERATING IDEAS: TECHNIQUES AND TOOLS FOR CREATING THE CONCEPT OF SOLUTIONS**

***Goal:***to get acquainted with the directions of practical application of different approaches to the process of generating ideas.

***Plan:***

3.1. Problem definition.

3.2. The process of finding new ideas.

3.3. Methods of generating new ideas.

***References:*** [1,3,6,7, 8,11,12,15,16].

**3.1. Problem definition.**

The only way to choose the optimal solution is to determine the content of the problem. After creating a map of empathy, focusing is carried out - this is a transitional stage, which involves the processing of all collected information.

Focusing is the next stage of the design thinking process. At this stage, a clear concept of the project is revealed. Gathering together everything that was heard and seen, from the information obtained is a complete picture, which determines the most important. At the focus stage, conclusions are drawn based on the information gathered in the empathy mode, and a concept is created that will be implemented in the project. Focusing is a deep comprehension of what has been gathered in the process of observation.

Focusing is critical and allows for a clear expression of the problem that needs to be addressed based on the information gathered about people's lives.

The essence of focusing is to formulate the question that should be related to the problem. This statement focuses on the conclusions made in the process of observation, the needs of a particular consumer or the image of a composite user - a person whose image is based on the characteristics of different consumers. Focus mode is also called "point of view" (POV).

The formulation of the problem is preceded by a number of procedures:

1. Division into clusters (groups with similar problems);

2. Selection of the person-model (the person-model is a typical user of the service or product);

3. Systematization of the most accurate quotations of consumer statements.

Idea generation is the development or development of new ideas that facilitate the creation of new ideas. Generation of ideas is a systematic search for ideas for new products. There are many ways to organize a constant search for ideas. The main components of the search for new products - is the analysis of sources and the use of creative methods of obtaining ideas.

During the project implementation, the design team works in three common spaces: a space of inspiration, where designers gather ideas from a variety of sources; the space of generating ideas, where such ideas are transformed into ideas; and an implementation space where the most successful ideas are transformed into concrete, full-fledged action plans.

**3.2. The process of finding new ideas.**

The next stage is the generation of ideas. At this stage, we are going to realize the search for a solution to the problem, which was defined earlier. At this stage, it is important to generate the full range of opportunities. We should realise that there is no room for one right idea.

The process of generating ideas should be aimed at expanding the possibilities of problem solving and looks like a branch to all possible concepts and results that can be used as an alternative solution to the problem. The basis for creating a prototype and an innovative solution is the representation of participants in the process of design thinking.

The use of different methods of generating ideas avoids potential complications and benefits, namely to:

– avoid obvious decisions and increase the innovative potential of the idea;

– use the collective imagination and strengths of the team;

– to open whole areas that were previously left out of consideration;

– to ensure the flow and flexibility (diversity) of innovative solutions.

In order to generate ideas, they use prototyping or creating a layout based on bodystorming, creating smart maps, sketches, etc.

An idea is created through a combination of rational thoughts and emotions based on established limitations, presentation of context and consideration of unrelated ideas.

The search for new ideas begins with the method of "silent brainstorming". This is followed by a discussion of ideas and development.

All formulated ideas are subject to verification of their viability by applying evaluation criteria and the use of filters.

**Procedure for selection, sorting and structuring of basic ideas:**

1. Formulation of selection criteria. If there are several criteria, then each of them must have a certain weight. Criteria allow to keep the innovative potential accumulated in the mode of generation of ideas;

2. Selection of an idea by voting (the danger of voting may be that if the majority supports the idea, the enthusiasm of the rest of the team may fade);

3. Creating a prototype and testing its functionality.

To find ideas, it is appropriate to use brainstorming, sketches, drawing up smart maps or building a layout. Either way is good, the main thing to remember is that the generation of ideas must be clearly separated from their evaluation. In this case, the imagination can be limitless.

**3.3. Methods of generating new ideas.**

The method of associating ideas is based on using the capabilities of the human senses (hearing, sight, touch) and his mental abilities to form the desired ideas. Observing, listening or feeling this or that real object, a person is able to move away from its image and imagine another that has a certain similarity, but is fundamentally different from it. The related original and valuable idea is recorded and used for further elaboration. During the observation and formation of the idea, the properties of the real and imaginary object are analyzed. On the basis of logical reasoning and direct comparison of these properties, the necessary decisions are made. It is clear that this process involves the availability of accurate answers to a number of specific questions. In particular, the advantages and disadvantages of the design of the product, the possibility of its use under new conditions or the implementation of large-scale (increased, decreased) modification of the product are clarified. Possibilities of changing the external design, layout or principles of operation of the product, replacement of materials, etc. are also studied. The answers to these questions allow you to create an image of the future object.

The method of generating ideas is based on the systematization of data on the development of a particular type of product in the past and on the logical analysis of these data to determine possible directions for product development in the future. Common means of generation are diagrams and matrices of ideas, the so-called brainstorming (the method of "brainstorming"), and heuristic methods.

The method of generating with the help of a diagram of ideas involves the use of appropriate graphic material that synthesizes the past experience of formation and development of the type of product under consideration.

The method of generation using a matrix of ideas is associated with penetration into the morphology (composition and structure) of the product. It is considered more productive because it allows you to get more combinations of ideas, including alternatives. The latter contributes to finding fundamentally new solutions. Morphological analysis is based on the construction of a matrix of characteristics of the object of forecasting and their possible values, followed by sorting and evaluation of variants of combinations of these values. It is realized on the basis of the construction of the so-called morphological block, which was proposed by the Swiss scientist F. Zwicky in the late 50's.

The procedure of morphological analysis is a consistent search of possible combinations of different characteristics (in our example - physical principles and technical solutions).

The sequence of stages of morphological analysis is as follows:

* the problem is described in general (no solutions are offered);
* the problem is decomposed into several components (for example, the parameters of the object are determined - shape, packaging material, contents);
* for each parameter several possible variants are offered (known and those which are not used yet in the goods presented in the market). This creates a matrix, the so-called morphological box, in the first column of which lists all the parameters, and on the right in the same row - alternative solutions;
* parameters and alternative solutions are combined (each solution consists of a set that requires one option for each parameter); the optimal solution is selected and implemented from the company's point of view.

The method of morphological analysis is very useful for designing new products, as well as to determine the possibility of patenting the basic parameters in order to "block" inventions that may appear in the future, and block competitors from imitating innovation.

The method of brainstorming was proposed by A. Osborne in the late 30's and as a very simple method. It provides for the presence of the following stages: preparatory; generation of ideas; analysis and evaluation of ideas.

There are several methods of brainstorming and its modifications:

* classic brainstorming;
* anonymous brainstorming;
* didactic brainstorming;
* destructive-constructive brainstorming;
* technique of creative cooperation.

*Anonymous brainstorming*. Brainstorming is carried out directly before the meeting. Participants are asked to formulate and write down all the ideas related to the problem on a piece of paper and give them to the facilitator. The facilitator presents the ideas consistently, without naming the authors, and the group develops and improves these ideas.

*Didactic brainstorming (Litt technique).* Prior to the meeting, the problem statement is known only to the facilitator, who brings the participants to the problem gradually during, as a rule, a series of meetings: first they are introduced only to general aspects of the problem, then additional information is displayed sequentially, so the problem is solved completely.

*Destructive-constructive brainstorming.* Brainstorming is carried out in two stages. At the first stage all defects of the existing solution of a problem are covered, and at the second search of new, better ideas is conducted.

*Technique of creative cooperation*. With this method, group work changes to individual. Initially, a group brainstorming session is performed for 10-15 minutes. Then the participants individually (5-10 minutes) think about the problem, write down new ideas. Improve the proposals made during the discussion.

The conference of ideas is a modification of the method of brainstorming, which has a higher pace of the meeting and involves friendly criticism in the form of remarks and comments. All ideas are recorded in the minutes, but the authors are not specified. A variant of this method is the conference of Hilde ideas, discussion 66, method 635.

*Hilde Ideas Conference*. Employees who are well acquainted with the problem and newcomers who are able to come up with new fresh ideas are involved in the conference of ideas, as they are not burdened by traditional approaches to solving it. Skeptics or experts who think they know better than others should not be invited to the conference. The chairman, whose status during the conference is equal to others, must maintain a relaxed atmosphere, moving steadily towards the goal.

*Discussion 66 (series of buzzing voices).* Participants are divided into groups of six people, each independently preparing his solution to the problem or working out a position on a particular issue. In each group the leader, the protocol clerk, the speaker is defined. Group work lasts about 6 minutes. After that, all groups meet in plenary, where a new view on the issue can be chosen, which is again discussed separately for a short time.

*Method 635.* A group of 6 participants analyzes and clearly articulates the problem. After that, each of the participants for 5 minutes enters in the form 3 proposals for solving the problem and passes the form to his neighbor, who takes into account the proposals of the predecessor and writes down three more of their own proposals. They may be due to certain associations with the recorded solutions or be completely new. After all participants have processed the forms, the process is completed. The time allowed for reflection in the final phases can be extended.

The next method of generating ideas is synectics. This is a really effective method of finding ideas, proposed by W. Gordon.

Synectics is the search for ideas for new products based on the use of analogies from other walks of life. Synectics is based on brainstorming, in which specialists from various fields of activity are invited to participate. The group from one assault to another gains experience in solving the problem. The main techniques used in synectic assault are based on analogy:

* direct (how tasks similar to the data are solved);
* personal (try to enter the image of the object given in the task and speak from this position);
* symbolic (give a figurative definition of the essence of the task);
* fantastic (as this task would be solved by fairy-tale characters).

*The method of control questions*. This method is implemented using a list of questions developed by A. Osborne, T. Ailoar, D. Pearson, G.L. Bush and others. The list proposed by A. Osborne includes 9 groups of questions:

* What new application can be suggested for the facility?
* What other object is similar to this and what can be copied?
* What modifications can be obtained by rotating, bending, twisting, turning, changing functions, color, shape, contour?
* What can be increased in the technical object (size, strength, number of elements, etc.)?
* What can be reduced (compacted, compressed, accelerated, narrowed, crushed) in a technical object?
* What can be replaced in the technical object (element, material, drive, etc.)?
* What can be reworked in the object (scheme, layout, procedure, etc.)?
* What can be done in the opposite way?
* What new combinations of elements are possible?

*Method of verbal associations.* When we are looking for needs that can be met, or working to improve the available product, service, ideas can prompt words. The method of verbal associations consists in methodical compilation and re-reading of the list of words and concepts until a word comes across a new idea. The source of verbal associations can be dictionaries, magazines on trade issues, technical literature.

*Heuristic methods* are based on associative abilities, intuitive thinking and the ability to control it. Such methods include various rules and guidelines that help solve problems without first evaluating the results. The most common heuristic methods are the methods of analogy and inversion.

*Methods of analogy* reflect the natural desire of man to imitate, i.e. to reproduce in the choice of features of objects, processes and phenomena of the environment, as well as mental abilities and physical properties of their own body. The desire to establish the similarities and differences between wildlife and man-made tools accompanies the individual at all stages of creative activity. They are still looking for analogies between an airplane and a bird, a manipulator and a human hand, a cybernetic device and a human brain. In general, generalized heuristic methods of analogy, depending on the specifics of the object of inheritance, are divided into two classes: methods of imitation of inanimate objects, methods of imitation of living objects (humans and other biological beings).

In modern practice of generating ideas, the method of precedent is widely used. It provides for the use in the new product of an original and effective functional principle, which was used in previous models, for example, vending machines, cash registers.

The method of constructive similarity (matrix principle) is the basis for the design of goods, which is a geometric (linear, planar or three-dimensional) analogy of existing ones. For example, a number of cars built on a common design basis, a series of household products.

The method of reintegration (the method of "Ariadne's thread") is also used in creative activity, which contributes to the creation of a new complex product by analogy with a relatively simple one. It is known that the rocket engine of F. Bandera was developed by analogy with a blowtorch. The pseudomorphization method is very often used to develop consumer goods. This method creates products that are similar in shape to existing ones, but have a different functional purpose. The purpose of such a product is to create a misconception about its true function. For example, a fountain pen in the form of a nail, a lighter-pistol, a radio-wallet.

Methods related to the imitation of living objects are widely used to generate ideas. For example, the method of paleobionics takes as prototypes for new products silhouettes of fossil animals (walking excavator).

The method of biomechanics is based on the reproduction in the developed goods of the principles of the mechanics of the movement of beings (helicopter).

The bioarchitecture method uses for new products the shapes and proportions inherent in wildlife (such as heating radiators, fences and other structures). When designing products that artificially reproduce the functions inherent in man, it is better to use the method of biocybernetics. Recently, the methods of bionics is a science that studies the laws and principles of functioning of a living organism in order to create artificial technical systems - are widely used in research practice. Self-learning automated systems, robotic devices, devices for pattern recognition is this is not a complete list of applications of bionic algorithms.

Logistics also includes methods of alternative search, based on the integrated use in the process of finding ideas for new products of such techniques, which form alternative pairs in the form of "reception - reception". For example, increase-decrease, hyperbolization-miniaturization, macroidealization-microidealization.

The method of inversion (from the Latin permutation) also plays an important role in finding ideas for new products. It involves finding solutions in directions that are the opposite of what is generally accepted for similar objects. For example, the method of inversion of working materials and substances involves the replacement of traditional types with non-traditional ones. This provides the ability to perform new functions or increases its usefulness. The method of inversion of the shape of the object involves changing the performance of the product due to deviations from traditional solutions. For example, an airplane with folding wings, a hydrofoil boat. If you want to take into account the conflicting requirements for structural materials, also use the method of inversion.

*Gamestorming* is a set of practices to facilitate innovation in the business world. The facilitator leads the group to a certain goal through play, structured activities that allow you to think freely, even playfully. The word "gamestorming" is a neologism about the use of games for "brainstorming". Games can be considered as an alternative to a standard business meeting. Most games involve 3 to 20 people and last from 15 minutes to an hour and a half. The game suspends some common life protocols and replaces them with a new set of interaction rules. Games may require multiple props, such as sticky notes, a poster, markers, random shots from magazines, or thoughts of provoking objects. Game skills include asking questions (opening, controlling, experimenting, closing), structuring large diagrams, sketching ideas, merging words and pictures into visual language, and most importantly, improvising to select and play a game or invent a new one. Gamestorming is used to study user experience, social media marketing, innovation, product development.

***Self-reflection***

1. What is the purpose of the focusing process?

2. Explain the essence of the concept of "composite consumer"

3. Describe the content of the problem formulation procedure.

4. How do we search, sort and structure basic ideas?

5. What is the purpose of generating ideas?

6. What methods of generating ideas do you know?

7. What factors influence the choice of a method of generating ideas?

**MODULE 2. *MODELING THE CONCEPT OF PROBLEM SOLVING***

**TOPIC 4**

**PROTOTYPING: APPLICATION OF A PRACTICAL APPROACH TO MODELING IDEAS**

***Goal:***identify areas for modelling ideas by prototyping.

***Plan:***

4.1. The essence of the process of prototyping.

4.2. Prototyping tools and technologies.

***References:*** [1,2,3,4,6,7, 9,12,16,17]

**4.1. The essence of the process of prototyping.**

A prototype is a layout of a solution that can be created from improvised materials.

Prototyping is the process of iteratively creating layouts that help invent the right solution.

Creating a prototype allows you to solve a number of problems:

* creating a prototype helps generate an idea to solve the problem;
* the prototype simplifies the presentation and increases the visualization;
* acts as an object for dialogue with potential consumers;
* it is cheaper to spend money on creating a prototype than to mass-produce a failed model of a product or service;
* simplifies the procedure of testing an idea for its capabilities;
* allows you to test several different ideas;
* expands the possibilities of managing the solution development process through minor changes, allowing to divide a large problem into a significant number of small ones for the convenience of their testing.

Simple prototypes are created at an early stage. In the future, the complexity and cost of prototypes increases.

Product evolution involves:

* modeling of the minimum viable product (MVP);
* creation of the main product that meets the key needs of the consumer;
* production of a full-featured product - an ideal solution to the problem of consumers.

The Product Evolution Canvas (PEC) allows you to answer questions about the functionality of the product:

* What is the product capable of?
* How can it be developed?
* What can you expect in the future?
* What results can we expect?

Working with RES involves finding answers to the following questions:

1. What makes a product functional?

2. How to improve the product so that it meets consumer expectations?

3. What elements can be added to the product to help it best unleash its potential to users?

The following are subject to prototyping:

* physical products;
* sites, services;
* software products and applications;
* interfaces;
* experience.

Modeling of physical objects can be done using:

* improvised materials;
* Lego constructors;
* 3D printer;
* 3D modeling programs.

**4.2. Prototyping tools and technologies.**

In order to create prototypes use the following tools:

* storytelling - a method of presenting an idea in the form of a story, characterized by a higher level of customer orientation;
* cardboard and paper models - a method of creating many solutions quickly and without significant costs;
* storyboard - a method of creating a frame-by-frame description of the use of products and services;
* Lego constructor;
* stop motion - creating a video that will form an idea of the atmosphere and conditions of use of a product that has not yet been created;
* bodystorming - images of services using people.

Storyboard - storyboard - is a tool that helps to visually predict and explore the user experience. It involves thinking about the product as if it were a movie in terms of how people use it. It helps to understand how people interact with the product in dynamics, giving you a clear idea of how to create a strong story (fig.3).

Prototyping of service interfaces based on use:

* paper prototypes (sketches);
* "live" prototype, created on the basis of services invisionapp.com, axure.com, the use of special programs for creating prototypes for mobile devices that allow you to add interactivity to static layouts;
* prototype in vector using Adobe Illustrator, InDesign, Scetch 3 or web services balsamiq.com, moqups.com, gomockingbird.com, uxpin.com and others;
* In order to create a prototype for a startup, it is convenient to use frameworks (software that facilitates the development and combination of various components of a larger software project) and code prototyping. The most popular service is bootstrap, which allows you to use ready-made components to create pages (input fields, buttons, etc.).

When creating a prototype, you must follow several principles:

* do not spend a lot of time creating each prototype;
* identify conditions that can be changed;
* When creating a prototype, always remember the consumer, predicting a possible reaction.



Fig. 3. Example of storyboarding

Source: Chelsea Hostetter, Austin Center for Design

***Self-reflection***

1. What is the purpose of the prototyping process?

2. What does the term "prototype" mean?

3. What tools are used to create a prototype of a new product or service?

4. What is the purpose of storytelling as a prototyping tool?

5. What is the purpose of bodystorming as a prototyping tool?

6. What is the purpose of using sideboards in the prototyping process?

7. What are the key principles to follow when creating prototypes of new products and services?

**TOPIC 5**

**TESTING: DEVELOPING A PROTOTYPE OF THE VARIANT OF SOLVING THE PROBLEM AND ESTIMATING THE OBTAINED RESULTS**

***Goal:***to find out the content of the procedure of testing innovative development and approaches to the evaluation of the obtained results.

***Plan:***

5.1. Development of a model for solving the problem.

5.2. Types of testing and algorithm for its implementation.

5.3. Directions for further product development.

***References:*** [1,3,4,5,6,7, 8, 9,13,14,17,18].

**5.1. Development of a model for solving the problem.**

Design thinkers seek to maneuver between constraints in the most creative way. They do this because they do not think about the problem, but about the project.

A project is a tool that transfers an idea from the realm of ideas to the realm of reality. Unlike many other processes to which we are accustomed, from playing the piano to paying bills, a design project is limited in time and cannot last forever. It has a beginning, a middle point and an end, and it is these limitations that connect it to reality. The expression of design thinking in the context of the project makes people clearly set a goal in the beginning. The project sets natural deadlines that ensure discipline and enable progress to be tracked, changes made and referrals. Clarity, focus and limitations of a well-formulated project are vital to maintaining high levels of creative energy.

The Innovate or Die Pedal-Powered Machine Contest is a great example of this. Google, together with the bicycle company Specialized, held a design competition, the modest goal of which was to use the bicycle to change the world. The winning team - five enthusiastic designers and a large family of enthusiastic fans - started late. In a few crazy weeks of brainstorming and prototyping, the team was able to identify the problem (1.1 billion people in developing countries do not have access to clean drinking water), explore a number of alternative solutions (mobile or stationary? trailer or luggage compartment?) And create a working prototype. Aquaduct, a pedal-powered tricycle that filters drinking water during transportation, now travels the world promoting innovation in providing people with clean water. The project was successful due to strict technological constraints (pedal drive), budget ($ 0.00) and tight deadlines. The experience of the Aquaduct team is the opposite of the experience that design teams get in most scientific or corporate laboratories, where the goal is to prolong the project indefinitely, and the end of the project means only the termination of its funding.

Hypothesis is not an algorithm, and in the same way a project task is not a set of instructions and not an attempt to answer an unasked question. Rather, a well-thought-out project task involves intuitive solutions, unpredictability, the vagaries of fate, because this is the world of creativity in which breakthrough ideas are born. If you know what you need - there is almost no point in looking.

Prototyping is the first stage of creating a product model - Product Evolution Canvas (PEC) - a tool for companies that create different products, suitable for brainstorming and consists of two components:

– time restrictions;

– three stages of product evolution.

Product evolution is the whole process of creating a prototype of a finished product (service, service), which contains three stages:

– modeling of the minimum viable product;

– creation of the main product, which covers the main demands of potential consumers;

– production of a full-featured product (ideal solution to the consumer's problem).

**5.2. Types of testing and algorithm for its implementation.**

Testing involves receiving feedback on the prototypes created, which is designed to understand the consumer and immerse them in the problem being processed. Testing saves money.

Ideal testing involves the involvement of the consumer, creating a situation that is as close as possible to the real one. Testing mode is a great opportunity to improve the initial idea. In order to be even more absorbed in the thoughts and feelings of the user, the designers offer:

1. Draw your thoughts (for example, draw a picture of how the user is set to work, or depict your thoughts on how to spend money in the best way).

2. Play the game with pre-made cards. The user plays by the rules devised by the designer, and this helps to get to know him better.

3. Be in a simulated situation. For example, you are developing an application that allows students to do homework on the go. It is advisable to ride a child (or an acquaintance of the student) in the car and see: is it really possible to do tasks on the road, and if so, how.

4. If there is a physical object to allow the consumer to take it with him and use in the testing process;

5. In the case of experience, it is advisable to create a scenario that will unfold around the real situation;

6. In the absence of the possibility of testing the prototype in reality, it is necessary to create a more or less realistic situation in which users could approach the prototype.

There is a simple rule in the testing process: always create a prototype, from the position that you are right, but test the prototype knowing that you are wrong.

Testing approaches:

– observation of the process of acquainting the consumer with the prototype and its actions;

– set a goal - to improve any targeted action.

Testing is necessary to achieve the following tasks:

– prototype and solution improvement;

– better understanding of the consumer;

– improving the "point of view", checking the correctness of the decision;

– to find out what attracts the consumer and what does not attract, based on the development of MVP (minimal value product), releasing a trial version, to conduct more complex types of testing.

The designer should strive to get the highest quality feedback during the testing process.

**5.3. Directions for further product development.**

The basis of further product development is the need for decision making.

Deciding in favor of a failed product can lead to the following consequences:

– failure - incorrectly identified product that has significant prospects, the risk of market failure;

– making a quick and impulsive decision, it is possible to face regret for the emotions that prevailed in the decision-making process;

– financial losses - a product that is unclaimed on the market will lead to losses and losses of the manufacturer.

Negative consequences can be avoided if after the process of generating ideas, prototyping the best option is selected based on the method of evaluation of ideas, then the chosen alternative will be implemented and evaluated for the effectiveness of the achieved results.

The methods of evaluating the ideas used in the process of design thinking include the following:

1. FAN method (table 3).

*Table 3*

*FAN method*

| ***Element*** | ***Relevant question*** |
| --- | --- |
| F – Feasible | Can this idea be implemented? |
| A – Attractive | Is this idea attractive, according to consumers? |
| N – Novel | Is this idea unique, original? |

2. Tesco's method involves finding answers to the questions of the initial evaluation of the solution:

– How much this decision will make your client's life better;

– Will this decision simplify the work of employees;

– Will the implementation of this solution save the company's resources.

3. Score evaluation is the most popular way to evaluate ideas, is to determine the evaluation criteria, further evaluation, determining the optimal solution based on the results of determining the final result of the scores. Which idea scored the most points, and is subject to further implementation

4. Group evaluation is based on the results of the evaluation of alternatives by the team according to the same algorithm as the score evaluation.

5. Reverse brainstorming involves compliance with the algorithm:

– Clear definition of the task;

– Flipping it by changing the roles of process participants;

– Gathering employees and conducting a regular brainstorming;

– Flipping through invented solutions;

– Evaluation of the decision on a scale.

The process of making the right decision can be complicated by the following factors:

– uncertainty;

– complexity;

– risks;

– alternatives;

– problems of interpersonal communications;

– lack of time;

– a narrow range of alternative solutions;

– cognitive barriers (errors of thinking, stereotypes, patterns, etc.), which are often caused by the illusion of control, professional distortion, contrast effect, "curse of knowledge" or "grief of the mind", player errors, systematic selection errors, confidence in justice, etc.).

Any solution can be implemented in 8 simple steps using the model of change of John Cotter - a professor at Harvard Business School and a famous American economist. Such stages of decision implementation include:

1. Creating an urgent need;

2. Creating a coalition (receiving assistance by attracting and identifying those who can help, people interested in implementing the decision);

3. Visualization of changes (priority outline of the results that the team expects and outline the steps that should be taken to implement the action plan);

4. Constant discussions and reflections;

5. Overcoming obstacles and resistance of the team, motivation of process participants;

6. Short-term victories;

7. Development of changes through gradual improvement of existing processes;

8. Consolidation of changes*.*

In the process of implementing the developed solution, problems may also arise, which are related to several possible reasons:

– lack of staff to work on the project;

– against users (consumers) of the product or service;

– lack of a clear action plan;

– incompetence of staff.

It is possible to overcome the existing obstacles by carrying out explanatory work, informing, communicating, encouraging participation and involvement, seeking support and assistance, conducting negotiations and concluding agreements, manipulation.

Achieving a positive result of the implementation of an innovative solution contributes to the interaction with consumers in the implementation process, which can be done using the following methods of interaction:

– interaction in social networks;

– product (service) testing;

– advertising aimed at informing;

– promotions, competitions and other means of communication;

– gamification;

– motivation for creative activity;

– conducting surveys, receiving feedback, feedback, etc.

An example of the application of design thinking in practice is the desire to increase sales of Samsung smartphones among the elderly. The problem: the elderly rarely bought smartphones because they were afraid of the difficulty of using gadgets. There was an instruction in the box with each device, but the small font, numerous terms and inconvenient format in it made it unreadable for the generation of retirement age. The solution to the problem was the offer of marketers to potential consumers of interactive books. They can practice inserting a SIM card into the slot, insert the battery and close the back cover, turn on the smartphone and dial numbers.

***Self-reflection***

1. What is the purpose of the process of testing a prototype of a new product or service?

2. What types of prototype testing do you know?

3. How to carry out the procedure of testing the prototype?

4. For what purpose is it necessary to carry out the procedure of testing a prototype of a new product or service?

5. In which case will the test results be considered positive or negative?

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**ADDITIONAL SOURCES**

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3. M.Iu. Lermontov city TSATU, 1 Peremogy Square Melitopol, Ukraine
4. Internet:
* http: // [www.bizpress.ws](http://www.bizpress.ws)
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