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ROBO-ADVISORS IN SOCIAL SECURITY

Abstract. The article provides information about accumulative pension ecosystem and particularly pension calculator (https://www.enpf.kz/ru/elektronnye-servisy/calcs.php) of the UAPF[1].

The data were collected through a structured survey among 16 current UAPFF participants to study the current challenges and opportunities of the pension calculator. The study revealed that the dynamic development of the robotic consulting sector requires greater involvement of both users and service providers, proper exchange of information between the parties about the functionality and improvements of the service, and, in general, further development of the components of the pension ecosystem.

This article contributes to the growing debate about Robo-advisors in the social security field, as existing retirement planning services are poorly understood and there is a lack of comprehensive research and scientific materials on this topic in the academic and business environment. This article will help users become savvier in creating retirement plans through digital services.

Keywords: Robo advisors, financial services, retirement planning, artificial intelligence, investment advice

Introduction

Currently, in the age of rapid development of financial technologies, an important condition for the financial well-being of citizens is awareness of the functional characteristics of modern financial instruments and financial literacy of the population, thanks to which people can make informed investment decisions regarding their finances. In turn, awareness of the functional characteristics of financial instruments and financial literacy of users are fundamental drivers of further development of digital technologies, since developers of technical solutions and the development of new products, as well as the development of existing tools, are built, first of all, on the basis of increasingly demanding user requests and analysis of customer experience.

One of the significant areas of the financial sector of Kazakhstan is objectively the sphere of social finance, which is entrusted with the important task of forming pension assets of citizens and ensuring the financial well-being of citizens at retirement age. In the context of the problem under study, digital technologies used by operators of the funded pension system are of great interest to the population, and this article will consider the results of the study on the topic of mobile applications and Robo-advisers used in planning pension savings, highlighting the advantages and disadvantages of these tools, as well as areas for further development. The widespread use of innovative technologies, including artificial intelligence, is the driving force behind the development of digital technologies, including in the financial sector. The financial sector, which traditionally supported live communication between service providers and recipients, is increasingly becoming digital. For example, banking services, insurance transactions, and investment of financial assets are now provided in digital format. In this regard, consulting services have also developed dynamically, since the decision-making process for any financial transaction is objectively preceded by high-quality financial advice aimed at determining the investor's preferences in choosing a financial product. One of such digital services is robot consultants or "robo-advisers", and in the context of pension provision - a pension calculator (https://www.enpf.kz/ru/elektronnye-servisy/calcs.php), (INFOGRAPHIC 1, 2).

[1] Unified Accumulative Pension Fund

Theoretical framework/ Literature review

Digital technologies are reshaping entire industries, redefining organizational processes, and influencing consumer behavior. In the realm of retirement planning, technological advancements are revolutionizing financial applications, with Robo-advisors and mobile applications serving as early indicators of the innovative developments (Agnew J. and Mitchell O.S., 2019). Modern digital technologies are not only disrupting traditional services, but are also transforming the service sector, including innovative changes in business models, relationships between firms and consumers, and the overall service ecosystem.

The most dynamically transforming sector is the financial sector, the pace of digitalization of which has accelerated objectively during the covid-19 pandemic (Deloitte and Institute of International Finance, 2020).

However, certain types of financial services do not receive active participation from consumers, for example, the pension planning services. This sector has low consumer involvement, but high levels of social significance and economic importance. Low involvement is associated with insufficient attention of consumers to issues related to financial security after retirement (in the so-called decumulation period), despite the fact that it is necessary to plan financial security and well-being during the period of active work (in the so-called accumulation period) (Brüggen E., Post T. and Schmitz K.,2019).

Currently, pension systems all over the world are faced with the task of rapid and fundamental changes related to the need to solve global problems of social security of the population. One of the main factors of such global problems is the increase in life expectancy and the aging of the population, which poses challenges such as an increased burden on the working population and, accordingly, on state budgets. According to UN forecasts (Wikipedia), by 2050, 22% of the world's population will be pensioners, as a result, worldwide, on average, there will be a pensioner for every working citizen (currently there will be 3 working citizens for every pensioner). Population aging is happening all over the world, in both developed countries and developing countries. One of the measures aimed at solving these problems is legislative changes in each country related to increasing the retirement age of citizens. Kazakhstan has also adopted appropriate amendments to its pension legislation in light of such threats, in the form of a gradual increase in the retirement age of women to 63, over the period until 2027.

According to the release of the National Statistics Bureau of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the country's population as of January 1, 2024, was more than 20 million people in the following age groups: up to 25 years old - 8.5 million people (42.6%), from 25 to 65 years old - 9.7 million people (48.5%), over 65 years old - 1.8 million people (8.9%). At the same time, it is projected that the population of Kazakhstan will reach 26.3 million people by the end of 2050 (https://www.enpf.kz/ru/about/press-center/news/index.php?ELEMENT_ID=14709). These forecasts show that by 2050 there will be a high level of demographic old age due to increased life expectancy, and by 2050, on average, every sixth Kazakhstani will be aged 60 years or older. According to the forecasts of the aforementioned structures, the potential support coefficient will continue to decrease to about 4.0 by 2050, which will increase the “burden” on the working-age population. Thus, demographic trends and long-term challenges pose a serious task for society related to its pension provision. In Kazakhstan, this task is solved by the funded pension system, which is more resilient to demographic and economic development processes. At the same time, the successful implementation of this system is of great importance for citizens to be aware of the mechanisms of the funded pension system and to have a personal interest in forming pension assets. In this regard, the role of modern technological tools for consulting citizens on forming pension plans in order to achieve the highest income replacement rates upon retirement is important. In this context, it is critical to develop innovative financial market products that can expand the range of options for households, firms and governments facing the challenge of an aging population and adequate pension provision and provide better risk management tools to cope with the demographic transition (O. Mitchell, 2018).

It should be noted that reforms in pension systems are generally accompanied by economic instability, financial crises of recent years, the expectation of a reduction in government payments,

including those caused by geopolitical factors, as well as the ongoing transition of funded pension systems from a defined benefit (DB) format to defined contributions (DC). Consequently, all of the above factors create an increasing risk of deterioration in the financial well-being of citizens during the decumulation period, accordingly increasing the personal responsibility of the individual citizen for the personal formation of adequate pension assets capable of ensuring a dignified old age. This responsibility, in turn, gives rise to an objective need for a citizen to obtain financial literacy, which allows him to understand financial terminology, the ability to choose investment strategies, assess the risks associated with the choice of investment portfolios, and, in general, financial planning of savings.

Consumers who fail to adequately plan for their retirement savings will end up with poor financial health in retirement, which in turn will place a burden on government social security. Regarding Kazakhstan, the problems are aggravated by the fact that private business practices informal employment, in which the employer does not make mandatory pension contributions (set at 10% of wages); accordingly, these unofficial workers will not accumulate pension assets in the Unified Accumulative Fund Pension Fund of Kazakhstan (UAPF). If the Employer does not enter into an employment contract, then mandatory pension contributions are not transferred to the employee; accordingly, when preparing documents for receiving a pension, problems arise with the lack of pension contributions. This is due to the fact that often citizens, when applying for a job, do not require formalization of labor relations with the employer and subsequently cannot legally challenge their rights (Melnik O., 2013). In the context of the legislation of the Republic of Kazakhstan, contributions to the UAPF act as official confirmation of work experience, which in turn is a guarantee for receiving the State basic pension, at a rate higher than the minimum amount, that is, in proportion to the length of service (According to Article 206 of the Social Code of the Republic of Kazakhstan, from January 1 In 2024, the basic state pension payment is assigned if there are 10 years or less of experience in the pension system or if it is completely absent. Its amount is 65% of the cost of living, while for each year worked in excess of 10 years, the basic pension increases by 2%.

Thus, encouraging consumers to take an increasingly active and conscious participation in pension planning is impossible without increasing financial literacy; accordingly, there is a boosting increase in innovative financial technologies in the field of personal pension consulting.

As noted in the Mercer Report, the average age of the population around the world continues to rise, mainly in more mature markets, while inflation and rising interest rates have created new market dynamics that pose serious challenges to pension plans, and the ongoing rift associated with globalization is noted, to name just a few of the increasingly complex issues facing pension funds that are seriously impacting retirees. It is noted that investment professionals must help the working population prepare for retirement. Each year, the Mercer Index serves as an important reminder that, in many jurisdictions, there is a long way to go to ensure that pension plans function at their best and provide long-term financial security for benefits.

The report also examines the potential of artificial intelligence (AI) to improve pension and social security systems and give people a better quality of life in retirement. AI has the potential to improve how pension systems interact with their participants and how people make long-term financial decisions. The risks of AI related to data confidentiality and ethical issues were also noted, in connection with which the importance of taking decisive measures to achieve participant confidence in AI tools under conditions of proper legislative regulation was noted. It is noted that AI has the ability to facilitate pension planning and a high standard of living after retirement (Mercer, 2023).

In response to these challenges, pension systems around the world are now investing significant effort and resources into expanding their online and digital presence, refocusing their online resources on a personalized financial services experience, including online personalized advice tools and pension calculators. At the same time, given the widespread trend of receiving services through mobile applications, the most popular are mobile applications of pension funds and investment companies. According to the G.D. Power 2023 U.S. Retirement Plan Digital Experience Study on overall Customer satisfaction Index Ranking, based on 1.000-point scale the next retirement

plan digital tools had the top 10 position: 1.Capital Group/American Funds, 2.Charles Schwab, 3.Bank of America/including Merrill, 4.Vanguard, 5.Fidelity, 6.Lincoln Finance Group, 7.T.Rowe Price, 8.Ascensus, 9.Principal Financial Group, 10.Study Average (G.D. Power, 2023).

The financial services sector within the pension industry is undergoing significant innovation and transformation. However, academic exploration of this field has only recently begun to gain traction. The shift from traditional face-to-face interactions to online service delivery, driven by technological advancements, presents a critical challenge for researchers and the academic community to conduct timely and relevant investigations. For the effective evolution of online pension services, research must address key factors such as financial literacy, consumer behavior, user interfaces, technical solutions, accessibility, and security. These elements are vital for enhancing service quality and achieving the primary objective: ensuring the financial well-being of citizens in retirement and fostering their active participation in planning and securing their financial future.

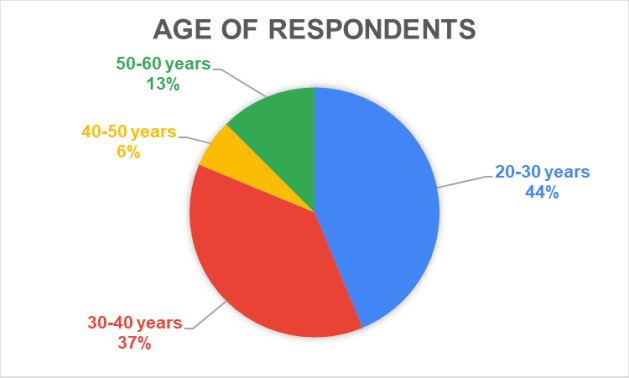
A central question for researchers, therefore, is how digital technologies can enhance consumer engagement in retirement planning and how such involvement impacts the broader pension ecosystem. The research, findings, and recommendations outlined in this article are intended to benefit all stakeholders within the multifaceted pension ecosystem.

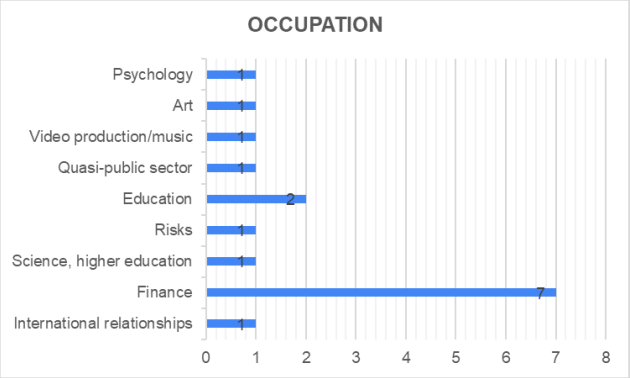
Research questions and Objectives

This article examines the impact of digital technologies on the financial consulting industry with a focus on the pension context of Kazakhstan as the main institution for social security of citizens. In preparing this article, the authors attempted to answer the following key questions: What advantages and problems (drawback) do modern Robo-consultants have for users and service providers in the field of pension provision? What are the ethical aspects of using Robo-consultants? How do Robo-consultants help the pension ecosystem achieve its main goal - conscious participation and involvement of the working population in the formation of personal pension savings and, ultimately, achieving financial well-being in old age?

Methodology and Analysis

A thematic analysis was conducted of information obtained from a survey of respondents from among UAPF contributors. When linking to the survey, the strategy for identifying potential interview participants was based on the desirability of including individuals from different occupations and age groups, covering all stages of pension savings formation (new contributors, middle-aged contributors, and pre-retirement contributors). As a result, 16 respondents from the relevant sample were included in the survey *(APPENDIX 1 - interview participants).*





The interviews were conducted online using a pre-prepared questionnaire based on the purpose of the study. The questionnaire, designed to explore the opinions and perceptions of UAPF members on their current pension provision and digital services, was structured around 3 themes and 27 questions: A 1-11) Digital technologies and retirement, B 1-4) Personalization, trust and security, C 1-12) User experience, feedback and improvement (*APPENDIX 2 - interview guide)*. The interview questions were created based on the objectives and research questions.

Interview protocols were compiled using Google service that processes online surveys. The online format of surveys guaranteed the anonymity and confidentiality of participants *(APPENDIX 3 – ethics approval).*

The survey results were examined using a qualitative analysis method (thematic coding, no software was used regarding moderate data). A qualitative method was employed to study preferences and user experiences with digital pension calculators, as it allows for a deeper exploration of subjective perceptions, behaviors, and nuanced feedback that quantitative methods might overlook.

Discussion/ Conclusions

In general, a "Robo-advisor" can be defined as an automated service that provides personalized financial products based on individual requests and needs. In popular publications and professional circles, the term "Robo-advisor" is most often used to refer to automated investment services related to the creation of a personalized investment portfolio (T.Baker and B.Dellaert, 2019).

The Accumulative Pension Fund of Kazakhstan (UAPF) offers advanced tools for pension forecasting and planning, including the "Pension Calculator" and the "Personal Pension Savings Plan." These tools enable fund participants to estimate their future pensions and devise strategies to enhance them. The pension calculator projects pension amounts based on existing savings and is available in two versions: the "Current" version, which simplifies the calculation of pension savings for those retiring in the upcoming year, and the "Forecast" version, which not only estimates the expected pension but also provides its components and three scenarios - pessimistic, realistic, and optimistic. Additionally, the UAPF offers a personal pension savings plan that calculates the expected pension amount and payment schedule based on current savings and future contributions. This plan allows users to determine the necessary future contributions to achieve their desired pension payments, considering their current savings, and to monitor the plan's progress through an automated notification system. All these services are accessible through the personal account on the UAPF's website and mobile application.

For the purposes of this study, it was essential to gauge the general awareness of Fund participants regarding digital technologies and to assess how these technologies have influenced the daily lives of savers. The surveyed individuals demonstrated a positive perception of modern digital technologies, highlighting their significant role in streamlining communication, managing information, facilitating work, and enhancing entertainment. Consequently, respondents believed that digital technologies had enriched, improved, and simplified everyday life. These technologies contributed to faster, more convenient processes, as evidenced by over 85% of respondents indicating frequent use of financial applications, such as online banking, UAPF apps, and pension calculators. Additionally, 87% of respondents preferred using smartphones, while 13% were comfortable accessing applications via computers. Over 75% of respondents emphasized the importance of companies optimizing their websites for mobile accessibility.

The findings reveal a positive attitude toward digital technologies and familiarity with UAPF's digital services, particularly robo-advisory tools. Before exploring the role of robo-advisors further, it was crucial to understand the broader context of the current pension ecosystem and investors' expectations for the future. When asked about their anticipated lifestyle over the next 20-30 years—regarding residence, work, leisure, and personal activities—the majority envisioned a harmonious, sustainable, and fulfilling life. Respondents projected working in fields they are passionate about, retiring in rural areas, engaging in remote work, leading active lifestyles, and traveling. Many also anticipated becoming self-employed, allocating resources toward both retirement and charitable causes. In response to concerns about the future, financial security, health, and the well-being of loved ones were the primary worries, while fewer respondents were concerned about environmental or geopolitical issues.

When asked about retirement, 75% of respondents expressed a positive outlook, while 19% found it difficult to answer. Most participants demonstrated moderate levels of engagement in thinking about their pensions—neither ignoring nor obsessing over the topic. Respondents suggested that the government could enhance citizen participation in pension savings through initiatives such as offering more favorable programs, improving transparency and communication, expanding

investment options, studying international best practices, and creating financial literacy resources. Employers were also identified as potential contributors, with suggestions including higher pension contributions through increased salaries, profit-based bonuses, and direct wage deductions for additional payments.

Respondents exhibited varying levels of understanding regarding Kazakhstan's pension system. Some described it as involving mandatory salary contributions managed and invested by the UAPF, which are distributed upon retirement. Others identified three primary types of pensions: solidarity, state, and funded. However, several respondents either had limited knowledge or struggled to provide answers. When asked about their awareness of pension savings and how easily they could understand related information, many indicated they had few significant questions about retirement. For those who did have concerns, issues such as access to savings when retiring abroad, account management, and the treatment of savings upon death emerged. These knowledge gaps regarding key aspects of the pension system—such as the accumulation process and personal responsibility—pose potential obstacles to the broader adoption of robo-advisor services.

In examining depositors' awareness of the capabilities of the pension calculator, respondents were asked whether it was possible to select a preferred investment portfolio and management strategy for their pension savings using the Fund's Pension Calculator. The results revealed that 13% of depositors answered "yes," while 44% responded "no." However, the pension calculator currently lacks such functionality, as it does not allow users to independently select an investment portfolio or management strategy. These findings highlight the need to enhance depositors' financial literacy regarding the purpose and features of the pension calculator. Additionally, consideration should be given to integrating functionality that enables users to select personalized investment strategies, aligning with their risk tolerance and portfolio performance goals.

A majority of respondents (75%) emphasized the importance of a predictive retirement calculator providing personalized recommendations tailored to the financial aspects of their retirement plan and their individual risk tolerance, this observation is similarly highlighted in other studies within this field. For instance, according to Ted Godbout, referencing a recent Cerulli report, retirement plan providers are increasingly prioritizing enhancements to the user experience, with particular emphasis on simplicity and personalization (Ted Godbout, 2022). However, only 38% of respondents expressed a willingness to share additional personal information, such as marital status, lifestyle details, health history, and significant life events, with the Foundation to facilitate more personalized communication efforts. A total of 44% of respondents indicated trust in their Fund regarding the security of personal data, information about their savings, and the protection of their pension savings. Regarding to data security, one fund member noted: "*Require two-factor authentication everywhere. So that no one can impersonate me and access my data*".

A significant majority of respondents (82%) indicated that the effectiveness of pension calculators and robo-advisors is directly influenced by the user's level of financial literacy. In the context of the social ecosystem, which also includes pension provision, it is important to note the International Social Security Association (ISSA) guidelines on communication by social security institutions and quality assurance, which state that communication ensures transparency and respect for confidentiality regarding state guarantees, and that information must be timely, accessible and adapted to changes of external and internal users. Multichannel communication is a strategy that includes more than one source or platform (web portals and online services, including on the calculation of the forecast pension, push notifications, email, social networks, chatbots, telephone communication, etc.) to provide information, interact with users and reach a more favorable environment. This is done within the framework of the concept of completeness and complementarity. The multichannel approach allows for a personalized approach to communication with users in accordance with the needs and preferences of users, which has a positive impact on the user experience and their level of satisfaction (ISSA, 2023).

When asked about the barriers or challenges associated with implementing these tools across different demographic groups (e.g., age groups, income levels), respondents provided the following insights: "*Low-income groups may struggle to understand all the tools presented*.", "*The older generation in Kazakhstan may be unprepared for the rapid pace of digitalization*.", "*Individuals with*

low levels of education may find it challenging to use such calculators and make informed investment decisions.", "*Barriers exist for both older individuals and younger people who lack interest*.", "*Certain terms can be difficult for some individuals to understand, making it beneficial to include explanatory notes for clarity*."

A substantial majority of survey participants (82%) reported no hesitation in using the pension calculator due to privacy or data security concerns, reflecting a strong level of trust in the service.

Regarding these aspects of survey, according to Cerulli Edge - U.S., plan providers are making significant investments in digital technology to, for example, better connect with younger generations (Gen Z) entering the workforce. As part of these investments, plan provider websites are increasingly incorporating education-focused designs and targeted communications. For example, providers use tailored messages that can be delivered across multiple digital channels, with mailings sent to specific target groups of members using algorithms that determine who is most likely to benefit from certain personalized recommendations. 86% of participants now find 401(k) savings tools and calculators useful for planning for retirement, up from 77% in 2020, according to the company. What's more, 72% express the same opinion about articles, videos and webinars offered online by their plan provider—a 20% increase from 2020 (52%). However, there are challenges, according to the reviewer, one of which is that while these expanded features are a positive development, they fail to address other barriers that keep participation levels low. Cerulli, for example, notes that these wellness programs still rely on participants struggling to manually enter accurate, personalized information, which, in addition to the time and energy required to fully participate in these programs, raises data privacy concerns. Thus, since financial education is lacking in much of the U.S. workforce, and financial service providers have a known audience within the retirement plans they serve, Cerulli recommends that providers continue their efforts to improve financial literacy, improve data privacy policies, and eliminate concerns that may prevent employees from taking full advantage of these programs. For example, according to Cerulli's research, if an employer guarantees participants confidentiality, they tend to be comfortable sharing personal information with their pension plan provider. The report also explains that Gen Z, who grew up with social media, smartphones and text messaging, demonstrate a greater preference for digital communications from their provider compared to other members overall. In this case, Cerulli recommends that service providers consider developing a social media presence.

To better align the pension calculator's functionality with saver needs and preferences, respondents suggested improvements such as incorporating short video tutorials for each section and simplifying the interface. These suggestions indicate that investors value clarity and ease of use in the service. The absence of detailed technical and professional recommendations regarding electronic service functionality may be attributed to the nascent stage of development and adoption of robo-advisor technologies. Over the long term, savers express optimism regarding the advancement of robo-advisor and pension calculator platforms, with expectations for the integration of artificial intelligence to enhance their functionality. Daniel Barr and Alexandra Bateman (2022) highlight that the primary challenge in designing a pension projection calculator lies in managing its complexity. This involves striking a careful balance between gathering data from diverse sources, converting intricate datasets into clear, consistent, and accurate information within a user-friendly timeframe, and addressing emerging business demands and regulatory requirements within the pension industry.

A majority of respondents (63%) perceive these tools as playing a crucial role in their financial planning and investment strategies for retirement. They also indicated that the future utilization of these platforms would be positively influenced by efficient pension savings management, accurate forecasting of savings and investment returns, the development of enhanced platforms, the incorporation of AI advancements, user-friendly interfaces, and clear accessibility. Conversely, factors such as excessive information overload, intrusive presentation, data security concerns, and significant forecast inaccuracies were identified as potential barriers to further adoption.

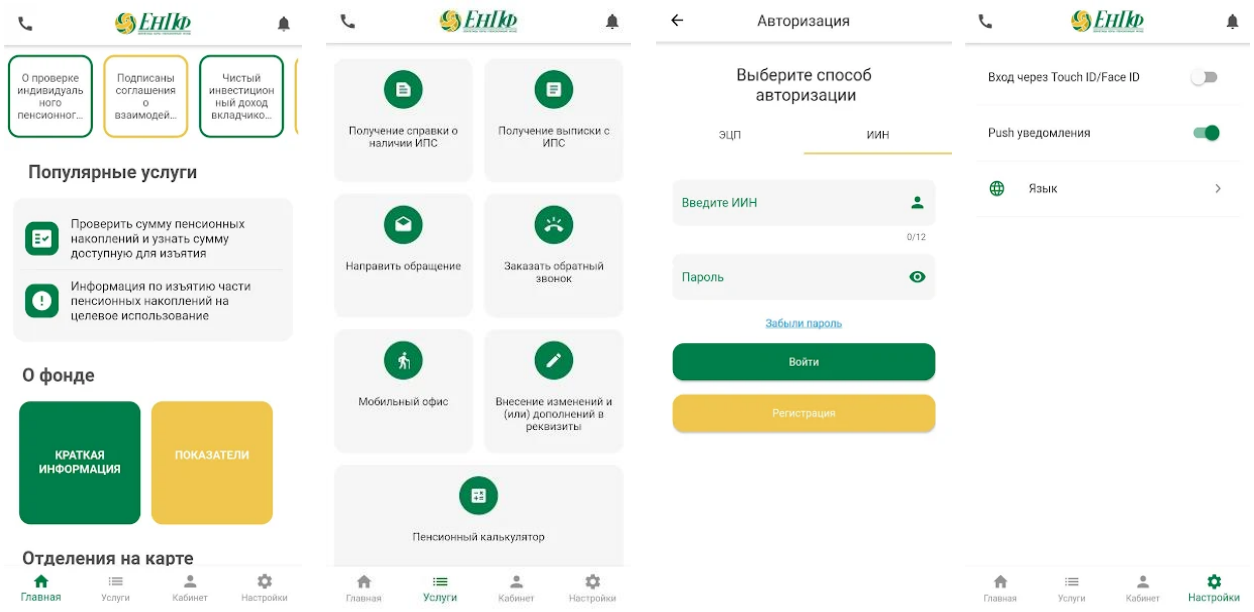
As noted by J. Agnew and O. Mitchell (2019) the further development of the robo-advisory market requires developers to avoid excessive specialization in Robo-advisors, which can complicate consumers' ability to select suitable services. Instead, the creation of universal hybrid products that address specific life stages—such as the accumulation and decumulation phases of retirement—along

with solutions for targeted needs like social package selection, annuity programs, or health insurance—is recommended. These technologies facilitate a wide range of financial decisions, simplifying their integration into life-cycle planning and decision-making. Ideally, FinTech should aim to develop comprehensive platforms that consolidate personal data and provide integrated advisory services. However, ensuring the secure protection of private financial data and addressing cybersecurity concerns remains crucial to safeguarding consumer privacy.

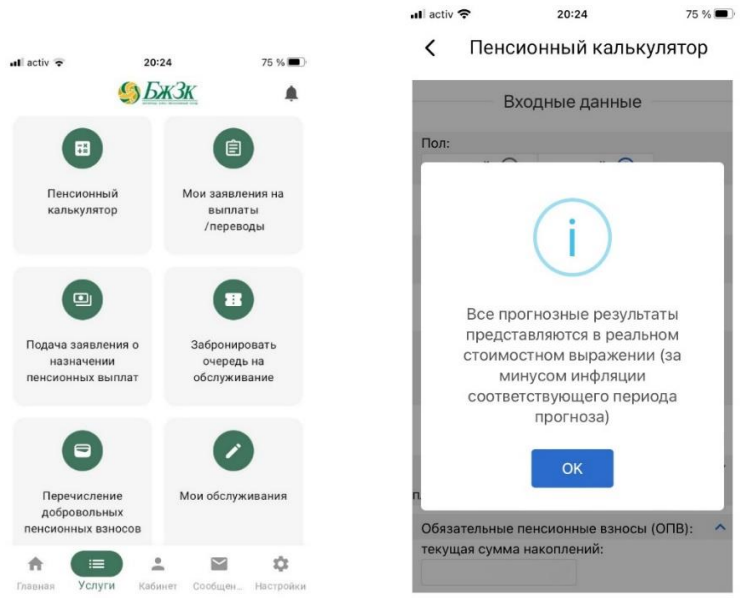
From the provided investigation results, four critical findings stand out based on their implications for improving user experience, enhancing functionality, and addressing adoption barriers of digital pension planning tools and robo-advisors:

- *Financial Literacy as a Key Driver for Effective Use*: A significant majority (82%) emphasized the importance of financial literacy in effectively utilizing pension calculators and robo-advisors. Low levels of financial literacy hinder the adoption and effective use of these tools. Educational initiatives, simplified interfaces, and explanatory resources are essential to bridge this gap.
- *User Preference for Personalization and Simplicity*: 75% of respondents highlighted the need for personalized recommendations tailored to individual financial goals and risk tolerances. However, only 38% were willing to share additional personal information to enable such personalization. Tools must balance the demand for personalization with users' privacy concerns. Enhancements like simplified interfaces, clear tutorials, and AI-driven recommendations could increase adoption while maintaining trust.
- *Barriers Among Demographic Groups*: Demographic challenges, such as limited digital literacy among older populations and low engagement among younger users, along with complexity in financial terminology, restrict broader adoption. Targeted strategies, such as educational campaigns tailored to specific groups and user-friendly design enhancements like visual aids or simplified terminology, are necessary to overcome these barriers.
- *Trust in Data Security and Privacy*: While 82% of participants trusted the pension calculator's security, the remaining 18% cited privacy concerns as a deterrent. Suggestions such as implementing two-factor authentication were noted to build trust. Robust security measures and transparent data privacy policies are critical to maintaining trust and encouraging broader use of digital pension tools.

These findings underscore the importance of addressing educational gaps, enhancing tool usability, leveraging personalization while respecting privacy, and ensuring robust security to foster greater adoption and effective utilization of Robo-advisors and pension calculators.

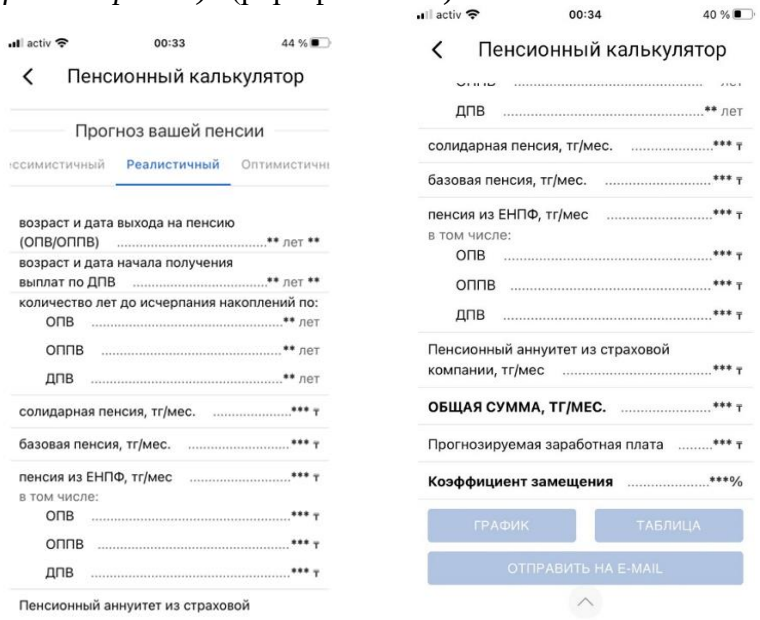


Infographic 1. UAPF Mobile App



Infographic 2. Pension Calculator of Mobile App (UAPF)

[i] "*All forecast results are presented in real value terms (minus inflation for the corresponding forecast period)*" (pop-up window)



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ҚАЗАҚСТАНДАҒЫ ӘЛЕУМЕТТІК ҚАМСЫЗДАНДЫРУ ҚЫЗМЕТТЕРІНДЕ РОБОТ-КЕҢЕСШІЛЕРДІҢ РӨЛІ

Аңдатпа. Мақалада жинақтаушы зейнетақы экожүйесі, атап айтқанда, Қазақстанның Бірыңғай жинақтаушы зейнетақы қорының (БЖЗҚ) зейнетақы калькуляторы қарастырылады. Деректер зейнетақы калькуляторының өзекті мәселелері мен мүмкіндіктерін зерделеу үшін БЖЗҚ-ның қазіргі 16 қатысушысы арасында құрылымдық сауалнама жүргізу арқылы жиналды. Зерттеу нәтижесінде робо-кеңес беру секторының серпінді дамуы пайдаланушыларды да, қызмет көрсетушілерді де көбірек тартуды, қызметтің функционалдығы мен жетілдірілуі туралы тараптардың дұрыс байланысын және тұтастай

алғанда зейнетақы экожүйесінің құрамдас бөліктерін одан әрі дамытуды талап ететіні анықталды. Бұл мақала әлеуметтік қамсыздандыру кеңістігіндегі робот-кеңесшілер туралы пікірталастың күшеюіне ықпал етеді, өйткені қазіргі кезде қалыптасқан зейнеткерлікке шығуды жоспарлау қызметтері нашар зерттелген және академиялық және іскерлік қауымдастықтарда тақырып бойынша жан-жақты ізденістер мен ғылыми жұмыстар қамтылмаған.

Түйін сөздер: Робо-кеңесшілер, қаржылық қызметтер, зейнеткерлік жоспарлау, жасанды интеллект, инвестициялық кеңес

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РОЛЬ РОБО-СОВЕТНИКОВ В УСЛУГАХ СОЦИАЛЬНОГО ОБЕСПЕЧЕНИЯ В КАЗАХСТАНЕ

Аннотация. В статье исследуется накопительная пенсионная экосистема и, в частности, пенсионный калькулятор единого накопительного пенсионного фонда казахстана (енпф). Данные были собраны путем структурированного опроса среди 16 действующих участников енпф для изучения текущих проблем и возможностей пенсионного калькулятора. Исследование показало, что динамичное развитие сектора роботизированного консультирования требует большей вовлеченности как пользователей, так и поставщиков услуг, надлежащего обмена информацией между сторонами о функциональности и улучшениях сервиса и, в целом, дальнейшего развития компонентов пенсионной экосистемы. Данная статья вносит вклад в растущую дискуссию о робо-консультантах в сфере социального обеспечения, поскольку существующие сервисы пенсионного планирования плохо изучены, а в академической и деловой среде отсутствуют комплексные исследования и научные материалы по этой теме.

Ключевые слова: роботы-консультанты, финансовые услуги, планирование выхода на пенсию, искусственный интеллект, инвестиционные консультации

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Appendices 1-3: interview participants, interview guide, ethics approval

APPENDIX 1 - INTERVIEW PARTICIPANTS

Occupation	Age	Gender	City	Ecosystem Actor	Interview Duration
International relationships	20-30 years	M	Astana	Consumer/ UAPF Member	00:40:20
Finance	30-40 years	M	Almaty	Consumer/ UAPF Member	00:30:25
Science, higher education	30-40 years	F	Almaty	Consumer/ UAPF Member	00:35:35
Finance	20-30 years	M	Astana	Consumer/ UAPF Member	00:45:20
Risks	50-60 years	F	Astana	Consumer/ UAPF Member	00:50:35
Education	20-30 years	F	Almaty	Consumer/ UAPF Member	00:47:15
Education	20-30 years	F	Almaty	Consumer/ UAPF Member	00:40:30
Finance	30-40 years	F	Almaty	Consumer/ UAPF Member	00:25:05
Finance	30-40 years	F	Almaty	Consumer/ UAPF Member	00:36:28
Finance	30-40 years	M	Almaty	Consumer/ UAPF Member	00:38:38
Finance	40-50 years	F	Almaty	Consumer/ UAPF Member	00:43:44
Quasi-public sector	20-30 years	M	Astana	Consumer/ UAPF Member	00:35:28
Video production/music	30-40 years	M	Astana	Consumer/ UAPF Member	00:37:25
Art	30-40 years	F	Astana	Consumer/ UAPF Member	00:48:20
Psychology	20-30 years	F	Astana	Consumer/ UAPF Member	00:30:20
Finance	50-60 years	F	Almaty	Consumer/ UAPF Member	00:36:25

APPENDIX 2 - INTERVIEW GUIDE

Interviewing UAPF members about the pension ecosystem and the UAPF mobile application

Dear Respondent!

We ask you to complete this interview, which concerns your personal experience of participating in the pension ecosystem of Kazakhstan, your experience of using the UAPF mobile application and, in particular, using the UAPF Pension Calculator. Your opinion and assessment, wishes and preferences are very important for the purposes of the study. We inform you that for the purposes of the study no personal data of respondents is used. Thank you for your participation and your time!

Topic 1 (A): Digital technologies and Retirement

1. What do you think about modern digital technologies? How has digital technology impacted your daily life?
2. How often do you use financial applications (for example, online brokers, banking, UAPF applications, etc.)?
3. How do you prefer to search for information: through a computer or a smartphone?
4. Can you describe what you think your life will look like in 20–30 years, including where you will be, your lifestyle, work and holidays?
5. What excites you when you think about the future?
6. How do you feel about retirement?
7. What else could your Fund (UAPF) do to make you more actively involved in pension provision?
8. What else could the Government do to encourage you to become more involved?
9. What could your employer do to encourage you to become more involved?
10. How well do you think your Fund (UAPF) uses digital technologies?
11. Can you explain in your own words how the Kazakhstan pension system works?

Topic 2 (B): Personalization, Trust and Security

1. Would you like your interaction with the Foundation to be more personalized? If so, what services and types of interaction should be personalized?
2. How would you feel about providing more personal information to your Foundation to

provide more personalized communications? (e.g. marital status, lifestyle information, health history, life events, etc.)
3. Do you trust your Fund with the security of your personal data and savings information?
4. Do you trust your Fund with the safety of your pension savings?

Topic 3 (C): User Experience, Feedback and Improvements:
1. How would you generally describe your experience of using the Mobile Application and the UAPF Pension Calculator?
2. Do you prefer platforms that automatically offer investment recommendations or those that provide more customizable options?
3. Do you think your Fund's Pension Calculator allows you to assist investors in determining the desired size of their future pension?
4. Is it possible to use the Fund's Pension Calculator to choose a preferred investment portfolio and investment management strategy for one's own pension savings?
5. How important is it to you that this service offers personalized recommendations based on your financial goals and risk tolerance?
6. How realistic, in your opinion, is it for people with different levels of financial literacy to effectively use pension calculators and Robo-advisor?
7. What barriers or challenges do you perceive in implementing these tools among different demographic groups (e.g., age groups, income levels)?
8. Have you ever hesitated to use a retirement calculator because of concerns about privacy or data security?
9. What changes or improvements would you like to see on these platforms to better suit your needs or preferences?
10. How do you see the use of Robo-Advisor or retirement calculator platforms evolving in the long term?
11. Do you think these tools play a significant role in your financial planning and retirement investment strategy?
12. What factors do you think will influence your continued use or potential cessation of using these platforms in the future?

APPENDIX 3 – ETHICS APPROVAL

All the research studies have been implemented according to the highest ethical values and the Research Ethics Policy general principles that underpin the ethical conduct of research by following the rules and regulations to maintain good ethics practice in all aspects of that work.

All the results of research are complied with COPE (Committee on Publication Ethics) guidelines (Available at: *https://publicationethics.org/guidance/Guidelines*) and the compliance of the research methodology, methods and tools of data collection, questionnaires, interviews with the principles of scientific ethics are approved.

An author of this research made a commitment to avoid the following ethical violations, all of those were properly undertaken:

- unauthorized use of confidential information;
- providing false information regarding applications for a scientific project;
- research that poses an unreasonable risk of harm to humans, animals, or the environment experience;
- falsification of data obtained during research;
- plagiarism or use of unverified sources;
- falsifying information of other authors;
- appropriation of someone's authorship.

When collecting data, the author of this study informed all survey participants about the purpose of the survey, explained the survey questions, and provided obligations to comply with the terms of confidentiality and protection of personal data. Accordingly, consent was obtained from the

participants for the collection and processing of data. Subsequently, when analyzing the data, complete anonymity and confidentiality of information about the survey participants was ensured.