

# Currency Conversion Project Report

## A Currency Conversion Visualization Tool for Baku, Azerbaijan

By Team 35 Tutor Group 8 CM2020

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### 2. Concept

The proposed project is an application designed to help users quickly find the best currency exchange rates and the closest bank branches in Azerbaijan, with an initial focus on the city of Baku. The app targets both locals seeking favorable exchange rates and tourists unfamiliar with the local banking landscape. Unlike online banking platforms, this application does not facilitate financial transactions but serves as a convenient tool to compare rates and locate bank branches.

The app's core functionality relies on data from Azerbaijani banks, which are required to report their exchange rates to the Central Bank. This information, available on platforms such as [infobank.az](http://infobank.az), will be integrated into the app to

provide accurate and real-time updates. Additionally, geolocation features will allow users to filter results by proximity, making it easier to find branches nearby offering competitive rates.

This tool aims to address a common challenge faced by users in navigating varying exchange rates and branch locations, particularly in a busy urban setting like Baku. By streamlining access to this information, the application enhances financial decision-making and convenience. The project has significant potential to benefit both locals and tourists while promoting transparency in currency exchange services.

### **3. Aims and Objectives**

#### **3.1. Aims**

Our primary aim is to develop a web-based application that allows both locals and tourists, to easily identify the best currency exchange rates and locate nearby bank branches in Azerbaijan. By providing real-time, accessible, and accurate information, the application seeks to enhance financial decision-making and convenience in the Baku market.

#### **3.2. Objectives**

1. Conduct research to validate the necessity and feasibility of the proposed application, using data from **infobank.az** and similar platforms with redundancy plans in case of data unavailability.
2. Perform market analysis to identify potential competitors and evaluate their strengths and limitations.
3. Develop an initial prototype that demonstrates key functionalities, such as rate comparison and branch geolocation, with a clear explanation of design decisions.
4. Conduct usability testing with our local team member to ensure the application meets user needs effectively.
5. Refine the design and features based on user feedback, ensuring the application meets user needs effectively.
6. Document the development process with a critical evaluation, addressing challenges, inaccuracies, and areas for future improvement.
7. Ensure the application adheres to accessibility standards and is scalable for potential expansion beyond Baku in the future.

## 4. Stakeholders

We have identified two main stakeholder groups: **locals in Baku** and **tourists**, with one other tertiary stakeholder group: **small and medium-sized enterprises (SMEs)**.

At the core are **locals in Baku**, who frequently require currency exchange services for travel, foreign purchases, or occasional financial needs. While the impact of exchange rate fluctuations on this group is moderate—given their primary use of the Azerbaijani manat—the application simplifies the process of finding favorable exchange rates and nearby bank branches. This convenience makes the tool an essential resource for locals seeking quick and reliable exchange services without extensive effort or research. Additionally, as we will see later, in cases of financial emergencies, locals will be the first to use the application in hopes to find the best exchange rates and nearby bank branches as quickly as possible. Locals typically speak Azerbaijani as their primary language, with many also fluent in Russian. These two languages are widely used in everyday life, making them essential for any application targeting this demographic. The application must prioritize Azerbaijani and Russian to ensure accessibility and usability for local users seeking efficient currency exchange solutions.

Another critical stakeholder group is **tourists**, who rely heavily on currency exchange services during their visits to Azerbaijan. Tourists are significantly impacted by exchange rate fluctuations, as these directly influence their spending power. They need tools that provide accurate comparisons and convenient access to nearby branches, making this application particularly valuable. They are also targeted by merchants offering inflated exchange rates to tourists. By addressing these needs, the application enhances the travel experience and supports the growing tourism sector in Azerbaijan. Tourists visiting Azerbaijan come from diverse linguistic backgrounds, but many rely on English for communication, especially those from Western countries, as well as Russian-speaking tourists from neighboring regions.

Additionally, **small and medium-sized enterprises (SMEs)**, particularly those involved in international trade, represent another potential stakeholder group. These businesses often face significant exposure to exchange rate fluctuations [1], which can affect their profit margins. While SMEs are not the primary target audience for the application, they may find value in its ability to provide accurate rate comparisons for foreign transactions. This utility can support SMEs in optimizing their exchange strategies and minimizing financial risks.

## 5. Product Research

### 5.1. Reason for the project

This project was conceived to address critical gaps in the current methods of finding currency exchange rates in Baku, Azerbaijan. Existing platforms like

azn.day.az and azn.az are widely used and appreciated for their functionality. These websites allow users to compare exchange rates across multiple banks, update information frequently (e.g., every 10 minutes), and support multiple languages, including Azerbaijani, Russian, and English. These features make them accessible and helpful for both locals and tourists.

However, despite their strengths, these platforms lack certain key functionalities that could significantly enhance the user experience. For instance, they do not provide geolocation features to help users find nearby exchange offices or ATMs. This limitation forces users to rely on manual research, often checking multiple websites and physically visiting offices, which can be inefficient and time-consuming. Additionally, neither platform includes detailed information on transaction limits, office hours, or safety considerations—features that would be especially beneficial for tourists navigating an unfamiliar city.

Our project aims to bridge these gaps by developing a tool that combines the best features of existing platforms with new, user-focused functionalities. By using up-to-date data from infobank.az and incorporating geolocation technology, the application will allow users to find the nearest exchange points quickly and efficiently. It will also provide essential details, such as transaction limits, office hours, and safety tips, ensuring that users have all the information they need to make informed decisions.

Tourists, in particular, will benefit from these enhancements. Many avoid using credit cards due to security concerns and rely heavily on cash. Having access to real-time information on nearby exchange offices and their services will alleviate many challenges they currently face. Locals will also benefit from the tool’s ability to streamline the process of finding the best exchange rates, saving time and effort.

In summary, this project addresses an unmet need in the market by combining real-time data aggregation, geolocation, and additional user-centric features. It will not only simplify financial decision-making but also provide a safer, more convenient experience for both locals and tourists in Baku.

## 5.2. SWOT Analysis

**5.2.1. Strengths** The platform’s strengths lie in its user-centric functionality, which combines real-time exchange rate data with geolocation services to simplify financial decisions. This dual-focused approach is highly appealing to both locals and tourists, addressing their specific needs intuitively. As a web-based application, it ensures accessibility across multiple devices without requiring installation, further enhancing convenience for users. Integration with **infobank.az** provides reliable, real-time updates based on data mandated by the Central Bank, ensuring the platform’s trustworthiness. Additionally, the inclusion of Google Maps API for geolocation and navigation sets this project apart by enabling users to locate nearby exchange offices efficiently, which is a standout feature not commonly available in similar tools.

**5.2.2. Weaknesses** However, the project also has notable weaknesses. The team faces challenges related to limited experience in software development, particularly in areas such as managing geolocation APIs, web hosting, and database systems. These gaps in expertise could extend development timelines and necessitate additional resources. Furthermore, the platform relies heavily on `infobank.az` for data, which introduces a dependency risk. Service interruptions, restricted access, or delayed updates could hinder the platform’s functionality. While a contingency plan involving web scraping from bank websites is in place, this fallback is less reliable and requires continuous maintenance.

**5.2.3. Opportunities** The project offers significant opportunities to leverage. Azerbaijan’s growing tourism sector creates a rising demand for reliable currency exchange solutions. Tourists, as a key user base, would greatly benefit from enhanced transparency and geolocation features. Small and medium-sized enterprises (SMEs) engaged in cross-border trade represent another potential audience, as the platform can streamline and optimize their currency exchange processes. Beyond Baku, the platform is scalable to other cities in Azerbaijan and potentially internationally to regions with similar needs. Collaborations with local banks, exchange offices, and tourism agencies also provide opportunities to increase visibility and generate revenue through sponsorships or premium listings.

**5.2.4. Threats** Despite its strengths and opportunities, the platform must address several threats. The competitive landscape includes large financial institutions or tech companies with substantial resources that could develop competing tools with broader features. Economic volatility, including fluctuations in exchange rates or unexpected political or economic crises, may impact the relevance and reliability of the platform’s data, especially for international users. Additionally, the collection and management of user location data present privacy risks. Any mishandling of this data could damage user trust and invite regulatory scrutiny, particularly under stringent global data protection standards.

### 5.3. PESTEL Analysis

**5.3.1. Political Factors** Azerbaijan’s declining media freedom presents significant risks for platforms engaging in editorial or public-facing content. Freedom House, a U.S.-based organization monitoring global freedom, reports widespread arrests of journalists and activists in Azerbaijan, leading to self-censorship and restricted expression [2].

**Implication:**

To mitigate our exposure to risks, our platform should avoid social or editorial features and focus on neutral data visualization, ensuring compliance with local regulations while maintaining user trust and operational safety.

## Azerbaijani Manat to United States Dollar

0.5882

↓ 53.75% -0.6835 MAX

Dec 5, 10:33:40 AM UTC · Disclaimer

1D 5D 1M 6M YTD 1Y 5Y MAX

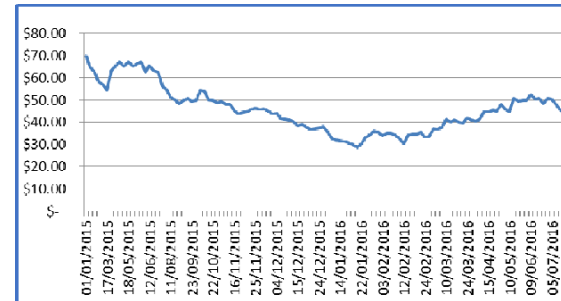


### 5.3.2. Economic Factors

> Google search for “Manat azn to usd max”

**5.3.2.1. Introduction to Manat** The Azerbaijani Manat emerged following the country’s independence from the Soviet Union, replacing the Soviet ruble as the national currency. [3] In its early years, the Manat maintained remarkable stability, pegged at approximately 0.78 to the US dollar for several years. [4] During this period, President Aliyev proudly declared it “one of the most stable currencies in the world.” [5]

**5.3.2.2. Economic Theory on Defending Currency Peg** The Manat’s peg to the US dollar proved unsustainable due to Azerbaijan’s heavy reliance on the oil market. When oil prices collapse, the Manat’s fixed exchange rate prevents the Central Bank of Azerbaijan from effectively intervening in the foreign exchange market to stabilize the currency. This dependency on oil means that fluctuations in oil prices directly impact the Manat’s value. To maintain the peg, the Central Bank is forced to purchase foreign currency, which rapidly depleted its foreign reserves. If the crisis continues long enough, the Central Bank will not have enough foreign currency to maintain the peg, and the currency will devalue, which will result in inflation, a crisis in confidence will result, causing holders of azn to panic and sell their azn, causing the currency to drop even more called a flight to quality. [6]



#### 5.3.2.3. Azeri Light Crude Oil Price Impact on Manat

> Analysis of the Price Change of the Azerbaijani Oil of Azeri Light, using the Monte-Carlo Method in the Conditions of Uncertainty - Scientific Figure on ResearchGate

**5.3.2.4. First Crisis: February 2015** The first occurred in February when the currency lost more than a third of its value against the dollar, causing what banking expert Akram Hasanov described as “serious damage to people and entrepreneurs.” [5]

In february 2015, the Central Bank of Azerbaijan abandoned the currency peg to the US dollar. [4]

**5.3.2.5. Second Crisis: December 2015** The second crisis hit in December when the central bank ceased protecting the Manat’s value, resulting in a dramatic 32% drop in a single day. This led to widespread panic, with people rushing to exchange their Manats for dollars, shops closing their doors, and banks imposing strict exchange limits while exchange offices ran out of dollars entirely.

#### Floating Exchange Rate

In the context of currency exchange, a “corridor” refers to a predetermined range within which a central bank aims to keep the exchange rate of a currency, essentially setting a ceiling and floor for how much the currency can fluctuate against other currencies; so, “dropping the exchange rate corridor” means the central bank is no longer actively intervening to keep the currency value within that specific range, allowing it to freely fluctuate based on market forces, which is called a “floating” exchange rate. [6]

**5.3.2.6. Return to De Facto Pegging** By 2017, the government implemented significant reforms, dropping the exchange rate corridor and allowing the Manat to float freely. This included removing the 4% trading range restriction and setting a new official rate at 1.7867, the weakest in its history. The reforms also saw an increase in currency conversion limits from \$200 to \$5,000 per person.

The overall decline was stark: from 2014 to 2017, the Manat lost approximately 53% of its value, primarily due to the collapse in oil prices, Azerbaijan’s main

export. This pattern was not unique to Azerbaijan, as similar trends were observed in other oil-dependent economies like Russia and Kazakhstan.

**5.3.2.7. Implications** With the Azerbaijani Manat currently operating under a soft peg to the US dollar at a fixed rate of 1.7, there remains an uncertainty surrounding its stability. This system, while currently providing stability, in 2023 S&P Analysis assumed that the peg will remain until 2026. [9]

“Nevertheless, in our view, should hydrocarbon prices drop sharply and remain low for a prolonged period, the authorities could consider adjusting the exchange rate. This would help avoid a substantial loss of foreign-currency buffers, similar to the central bank’s actions in 2015”

S&P Analysis quoted in “Azerbaijani Manat’s Peg to the US Dollar to Stay Firm until 2026.” by Trend.Az

In October 2024, the Azerbaijani Ministry of Finance’s forecast predicts that the manat’s exchange rate will stay at its current level through 2028. [10] Despite this, there is still an uncertainty surrounding the long-term sustainability of the peg.

In a plausible future scenario where oil prices significantly decline, there would likely be another loss of confidence in the Manat. This could lead to another rush by individuals and businesses to exchange their Manats for US dollars, up to the maximum amount allowed by the Central Bank of Azerbaijan (CBA). Such behavior would reflect a flight to safety as people seek to safeguard their wealth against potential currency devaluation.

This scenarios provides a tangible use case for or project to aid in an efficeint and fast way to locate a bank or exchange office to convert azn to usd.

**5.3.3. Social Factors** Azerbaijan’s demographic landscape and technological adoption present both opportunities and challenges for the implementation of a currency exchange platform. The country boasts a high literacy rate, with approximately 99.78% of individuals aged 15 and above being able to read and write [11]. Internet penetration is also significant, standing at 88% as of 2022 [12]. Additionally, smartphone penetration exceeds 70%, surpassing many European nations [13]. Despite these encouraging statistics, financial literacy remains a concern. Studies indicate that the overall level of financial literacy among students is around 48%, with male students exhibiting higher financial literacy than their female counterparts [14]. This gap suggests a need for educational initiatives to enhance financial understanding across all demographics. Moreover, while urban areas enjoy widespread internet access, rural regions may experience disparities in connectivity and digital literacy. This urban-rural divide could affect the equitable adoption of digital financial services.



**5.3.3.1. Implications** The high literacy rate and substantial internet and smartphone penetration in Azerbaijan provide a solid foundation for the adoption of digital platforms like the proposed currency exchange application.

However, the relatively low financial literacy levels necessitate the inclusion of user-friendly features and educational components within the app to assist users in making informed decisions.

Additionally, efforts should be made to ensure that the platform is accessible and functional for users in both urban and rural settings, taking into account potential differences in internet connectivity and digital proficiency.

**5.3.4. Technological Factors** Azerbaijan’s commitment to digital transformation is evident in initiatives like the Digital Trade Hub, which promotes electronic payments and digital commerce [15]. This shift towards a cashless society aligns with the app’s goals of simplifying and streamlining financial processes.

The Azerbaijan’s mobile internet infrastructure has grown rapidly, with 4G coverage now available to 94% of the population, and 5G rollout plans in progress [16]. The increasing adoption of 5G technology is expected to enhance mobile internet speeds and reduce latency, offering better user experiences for mobile applications.

The Azerbaijani government has invested significantly in IT education, launching coding programs and tech hubs to nurture local talent [17]. This is fostering an ecosystem that could support the development and maintenance of tech solutions like the currency exchange app. Additionally, cybersecurity threats, such as phishing attacks and data breaches, are increasing globally and could pose risks to user trust and data protection [18]. Geolocation data is particularly sensitive. Mismanagement of such information can expose users to privacy risks, such as location tracking or profiling by malicious actors. Implementing anonymized geolocation queries (e.g., by rounding location coordinates to a certain range) can reduce the precision of stored data while preserving the app’s functionality [19].

**5.3.4.1. Implications** The widespread mobile internet and smartphone penetration in Azerbaijan provide a strong foundation for the adoption of the currency exchange application. The ongoing digital transformation and government support for tech initiatives create an enabling environment for the app’s development and integration. However, rural connectivity challenges and cybersecurity risks must be addressed to ensure equitable access and user trust. Implementing strong geolocation data protection measures could mitigate these concerns.

**5.3.5. Environmental Factors** Environmental factors play a lesser but still relevant role in the development of a digital platform like the Baku Currency

Exchange Rate Finder. While the direct environmental impact of the application is minimal, there are significant considerations regarding transportation and tourism trends.

The app’s geolocation feature, which guides users to nearby exchange offices, could encourage efficient travel routes, minimizing unnecessary trips and thereby reducing carbon emissions. This aligns with broader goals of sustainable urban mobility, as highlighted in studies on geolocation and its role in reducing carbon footprints [23]. However, this benefit is contingent on the app’s accuracy and real-time updates.

A growing focus on sustainability in tourism is evident globally, including in Azerbaijan, where efforts are being made to adapt tourism practices to environmental concerns [24]. According to the World Tourism Organization (UNWTO), eco-conscious tourism has seen a sharp rise in interest, with travelers actively seeking sustainable services and solutions [25]. Tourists are increasingly prioritizing eco-conscious services and destinations, and the app’s digital-first, paperless approach contributes to reducing environmental waste [26]. Positioning the app as an environmentally responsible solution could enhance its appeal to eco-conscious users.

Additionally, climate risks such as floods, heatwaves, or other extreme weather events may affect travel patterns and the reliability of banking infrastructure. These events could disrupt user access to physical exchange offices or banking services [27], underscoring the importance of providing real-time updates to adapt to changing conditions.

**5.3.6. Legal Factors** Developing a currency exchange application in Azerbaijan requires adherence to several legal frameworks and considerations:

Azerbaijan’s Law on Legal Protection of Compilations of Data governs the use of publicly available data, including web scraping. Unauthorized scraping of data from bank websites or currency exchange platforms could potentially infringe on intellectual property rights. If proprietary or sensitive data is collected without explicit permission, it may lead to legal challenges. Therefore, the project should prioritize obtaining explicit permissions or licenses from banks and data providers for data usage [28].

Analysis of one of the Bank’s policies reveals that although there is no explicit prohibition of the data scraping, however generally they prohibit use of the information from their websites [29]. Despite that majority of other banks located in Baku do not expose Terms of Service or Data Privacy policies in English, data scraping (such as currency rates, branch addresses etc.) legality then is uncertain, and still poses legal risks.

Additionally, the application must ensure it does not inadvertently facilitate unregulated financial transactions, which may contravene laws governing financial services. While the app itself does not handle transactions, its role in connect-

ing users to banks requires clarity in disclaimers and operational transparency. Implications

#### **5.3.6.1. Implications** To mitigate risks:

Obtain explicit permissions for scraping or accessing bank data to avoid intellectual property violations.

Exclude any suggestion of provision of financial services by our app. If necessary, include disclaimers clearly stating the app's role as an informational tool, not a financial service provider, to limit liability.

Prioritize user consent and data protection measures to comply with personal data laws and safeguard user trust.

### **5.4. Market Research**

Developing the Baku Currency Exchange Rate Finder app requires an understanding of the current market landscape, including available tools, their limitations, and user needs. The following analysis reviews the findings from user questionnaires, evaluates existing platforms in Baku, and compares international equivalents for additional insights.

#### **5.4.1. Current Solutions in Baku**

##### **5.4.1.1. Day.az** <https://azn.az>

A popular news website that aggregates currency exchange rates from various banks in Azerbaijan

Strengths: Provides basic exchange rate information. Includes working hours of banks and addresses linked to Google Maps. Weaknesses: Lacks geolocation functionality, forcing users to search manually. No real-time updates for branch availability or transaction limits. Limited multilingual support (no tourist-friendly interface).

##### **5.4.1.2. Azn.az** Another local aggregator that lists exchange rates.

Unlike Day.az, Azn.az is azn.az lacks any translation to English. The user is left to using their browsers translation feature to offer a aznerbiani to their language. We found Google's Chrome Translate to be the most accurate and reliable translation tool, other browsers like Windows Edge are not able to translate the page.

This page like Day.az lacks any location information, and only provides the exchange rates.



## Valyuta məzənnələri onlayn

Bu gün üçün ən yaxşı valyuta məzənnələri. Azərbaycanın banklarında onlayn rejimdə sərfəli valyuta məzənnələri.

Valyuta	AMB məzənnələri	Bakının valyuta dəyişmə məntəqələrində ən yaxşı məzənnələr	
		BANK ALIR	BANK SATIR
USD	1.7000 manat 1 ABŞ dolları üçün	1.7000 TuranBank, Rabitabank, Bank Melli İran	1.7020 Azərbaycan Beynəlxalq Bankı, Azer Turk Bank
EUR	1.7724 manat 1 avro üçün	1.7640 Bank Melli İran	1.7813 Azərbaycan Beynəlxalq Bankı
TRY	0.0485 manat 1 Türkiyə lirası üçün	0.0430 Azərbaycan Beynəlxalq Bankı	0.0485 TuranBank
RUB	1.6318 manat 1 Rusiya rublu üçün	0.0153 Rabitabank	0.0164 TuranBank

### 2 yanvar 2025-ci ilə olan məzənnə kursları

Valyuta:				
USD - ABŞ dolları				
Bankın adı	Bank alır (Nağd) ▼	Bank satır (Nağd)	Bank alır (Nağdsız)	Bank satır (Nağdsız)
Bank Melli İran	1.7000	1.7025	1.6900	1.7070
TuranBank	1.7000	1.7025	1.7000	1.7025
Rabitabank	1.7000	1.7025	1.6990	1.7025
Yelo Bank	1.6990	1.7025	1.6990	1.7025
Unibank	1.6990	1.7025	1.6900	1.7025
Express Bank	1.6990	1.7025	1.6990	1.7000
Access Bank	1.6990	1.7025	1.6950	1.7025

Figure 1: Day.az

### Current exchange rates in banks in Azerbaijan (Cash)

USD/EUR	RUB/GBP	TRY
Currency	Central Bank exchange rate	The most favorable exchange rate
USD	0.00	<div>PURCHASE</div> <div>1,726</div> <div>Bank of the Republic</div> <div>SALE</div> <div>1,7020</div> <div>International Bank of Azerbaijan</div> <div>Capital Bank</div> <div>Pasha Bank</div>
EUR	0.00	<div>1,7600</div> <div>Azerbaijan Industrial Bank</div> <div>1,7025</div> <div>Bank of the Republic</div>







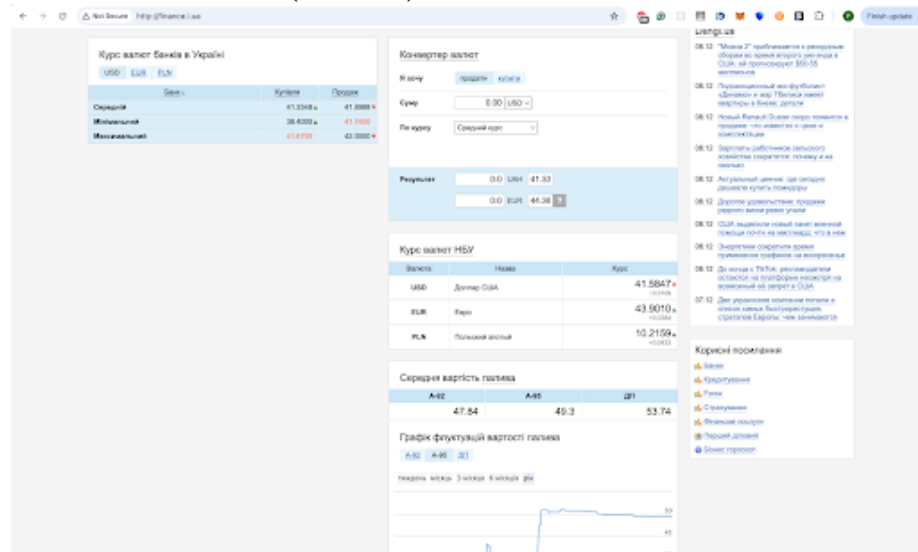
No.	Bank	USD		EUR		Update time
		Purchase v ^	Sale v ^	Purchase v ^	Sale v ^	2025-01-02 02:00:07
1	 Access Bank	1,6990	1,7025	1,7370	1,7901	
2	 AFB Bank	1,697	1,7025	1,7465	1,787	
3	 International Bank of Azerbaijan	1,6970	1,7020	1,7370	1,7813	
4	 Azerbaijan Industrial Bank	1,6950	1,7025	1,7600	1,8000	
5	 Bank of the Republic	1,726	1,82	1,69	1,7025	
6	 Capital Bank	1,6970	1,7020	1,7524	1,7995	

Figure 2: azn.az

**5.4.1.3. Bank-Specific Websites** Most banks in Azerbaijan publish exchange rates on their official websites, such as Kapital Bank and PASHA Bank. However, these individual bank websites have significant limitations - users must visit multiple sites to compare rates between different banks, and the sites lack helpful features like geolocation capabilities, transaction limit information, or other convenience-focused functionality.

## 5.4.2. International Products

### 5.4.2.1. Finance.i.ua (Ukraine)



Finance.i.ua offers a comprehensive platform that aggregates exchange rates

from various financial institutions, providing users with transparent transaction fee information alongside useful tools like calculators and historical rate tracking. However, the platform falls short in several areas - it lacks geolocation capabilities and branch navigation features that would help users physically locate exchange points. Additionally, the interface is not optimized for non-native speakers or tourists, limiting its accessibility to a broader international audience.

**5.4.2.2. XE Currency App (Global)** XE Currency App is a widely-used global currency exchange platform that provides real-time exchange rate information and online exchange services. While it excels at delivering up-to-date currency data on a global scale, its broad focus means it lacks features specifically tailored to local markets like Baku. The app does not aggregate rates from multiple providers, instead offering its own exchange services, which can introduce bias in the rates displayed. Additionally, due to its global nature, it does not include navigation features or detailed information about specific bank branches that would be valuable for users trying to find physical exchange locations in Baku.

**5.4.3. Gap Analysis** Analysis of current platforms reveals significant limitations in serving Baku's currency exchange market. Local platforms like *azn.day.az* and *azn.az* lack essential features that would greatly enhance user experience. Neither platform currently implements geolocation functionality to help users locate nearby exchange offices, which would be particularly valuable for both locals and tourists navigating the city. The absence of comprehensive multilingual support creates barriers for non-native speakers, while limited transparency regarding transaction limits and fees leaves users unable to properly plan their exchanges. These platforms also show no consideration for accessibility needs, such as information about step-free access or accessible parking, excluding users with mobility requirements. Additionally, they fail to provide crucial safety information for tourists about identifying trustworthy exchange offices and avoiding common scams, leaving visitors vulnerable in an unfamiliar financial landscape.

International platforms, while sophisticated in their global currency tracking capabilities, fall short in addressing Baku-specific needs. Applications like XE Currency lack integration with local banking systems and fail to provide detailed information about specific exchange offices in Baku. They don't offer essential features for tourists such as safety guidelines, reliable branch ratings, or navigation assistance to physical locations. The absence of local context and practical information about operating hours, parking availability, and auxiliary services like crypto exchange makes these platforms less useful for users in Baku.

Currently, users must resort to time-consuming manual research, checking multiple websites and physically visiting different exchange offices to find suitable services. This process is highly inefficient and particularly challenging for tourists

who may arrive at offices only to find they are closed or don't offer competitive rates. These gaps in the current market present clear opportunities for our application to provide a more comprehensive solution that combines accurate exchange rate information with practical features like geolocation, accessibility details, safety guidance, and convenience services, creating a more valuable tool for both local users and tourists navigating Baku's currency exchange landscape.

## 6. Technical and Functional Requirements/Specifications

### 6.1. Source of Data

**6.1.1. Public APIs or Web Services** Many banks provide publicly accessible APIs or web services that share real-time data, such as exchange rates. These APIs allow external platforms to retrieve up-to-date currency information in a structured format (e.g., JSON or XML). - Cant find any examples - Finding an API is probably the best case scenario

**6.1.2. Web Scraping** If APIs are not available, the site might use web scraping techniques to extract data directly from the exchange rate pages of bank websites. This involves automated scripts that fetch and parse HTML content to extract relevant data fields.

**6.1.3. FTP Servers or Feeds** Some banks may offer currency rate data via FTP servers or syndicated feeds (like RSS or XML). These are periodically updated by the banks. - Im not sure how this would work, is it a lower tech api? - This would work if we can find a bank that offers this service.

**6.1.4. Data Aggregators (Portals)** Instead of direct integration with each bank, [azn.day.az](http://azn.day.az) might use third-party aggregators that collect and consolidate exchange rate data from multiple banks, providing it through a single API or feed.



Figure 3: infobank.az logo

**6.1.4.1. infobank.az** While attempting to access the infobank.az website directly, we found that it does not load properly. However, we discovered that many banks' websites contain the infobank.az logo at the bottom of their pages, which links to the infobank.az website. Through our research and the company's LinkedIn profile, we identified several major banks that utilize infobank.az's services, including Access Bank, Afb bank, Azerpost, International Bank of Azerbaijan, ASB Azerbaijan Industry Bank, Bank of the Republic, Premium Bank,



VTB Bank (Azerbaijan), Kapital Bank, and Rabita Bank. Notable exceptions include Pasha Bank, though it has become increasingly difficult to definitively determine which banks do not use the service, as some may utilize it without prominently displaying the logo or partnership.



Figure 4: MALIYY SAVADLILIGI Portalı

#### 6.1.4.2. MALIYY SAVADLILIGI Portalı. [link](#)

The MALIYY SAVADLILIGI Portalı was initially observed on the Turanbank website, though it may have been utilized by other banks prior to this discovery. Based on observed patterns, it appears that banks using infobank.az services likely also integrate with this portal. However, attempts to access the portal's links have been unsuccessful, making it difficult to fully understand its functionality and role in the banking ecosystem.



Figure 5: cbar.az logo

**6.1.4.3. Mərkəzi Bankı** The Central Bank of Azerbaijan (CBAR) serves as the country's central banking institution. While initially appearing to be just a standard website link, further investigation suggests it may function as a data portal as well. Additional research would be needed to fully understand its capabilities and potential integration options. ##### 6.1.4.4. Adif



Figure 6: adif.gov.az logo

link



Figure 7: egov logo

**6.1.4.5. Elektran Hükumat portalı (egov)** While both Adif and egov logos appear on many bank websites, they appear to be separate entities. The egov portal, like infobank, is widely displayed across banking sites and appears to be a government portal for insurance or benefits. However, due to its focus on government services rather than financial data, it likely falls outside the scope of this project’s requirements.

**6.1.5. Consolidated Bank List** From azn.day.az and azn.az

index	Bank	Link	Scrape?	Original Source	in-fobank.az.az	Portal: MALIYY SAVADLIL-IGI Por-	Portal: cbar.az	Portal: Adif
1	Access Bank	link	Easy to scrape, scroll down from home page	both	yes	yes	yes	maybe it says egov
2	AFB Bank	link	Easy to scrape, scroll down from home page	both	yes	yes	yes	maybe it says egov

<div> <div>Portal: MALIYY SAVADLIL- IGI</div> <div>Portal: IGI</div> <div>Portal: Por- IGI</div> <div>Portal: MALIYY SAVADLIL- IGI</div> <div>Portal: Por- IGI</div> <div>Portal: MALIYY SAVADLIL- IGI</div> <div>Portal: MALIYY SAVADLIL- IGI</div> <div>Portal: MALIYY SAVADLIL- IGI</div> <div>Portal: MALIYY SAVADLIL- IGI</div> </div>								
index	Bank	Link	Scrape?	Original Source	in-fobank.az	Portal: IGI	Portal: Por- IGI	Portal: MALIYY SAVADLIL- IGI
3	Azerpostlink		Easy to scrape, scroll down from home page	azn.day.az	yes			
4	International Bank of Azerbaijan	link	Easy to scrape, scroll down from home page *no https	both	yes	yes	not sure	yes
5	ASB Azerbaijan Industry Bank	link	Might need javascript to load as exchanged rates flash in the top right corner	both	yes			
6	Bank of the Republic	link	Easy to scrape, scroll down from home page	azn.day.az (listed as Bank Respublika)	yes	yes	no	egov

index	Bank	Link	Scrape?	Original Source	Portal: in-fobank.az	Portal: MALIYY SAVADLIL-IGI Por-	Portal: cbar.az	Portal: Adif
7	Premiumlink Bank		Might need javascript to load as exchanged rates flash in the top right corner	both	yes	yes	not sure	not sure
8	VTB Bank (Azerbaijan)	link	Easy to scrape, scroll down from home page	azn.az	yes	not sure	not sure	yes and egov
9	Kapital Bank	link	Easy to scrape, scroll down from home page	azn.az	yes	yes	not sure	yes and egov
10	Pasha Bank	link	Easy to scrape, scroll down from home page	azn.az	not sure	not sure	not sure	yes

index	Bank	Link	Scrape?	Original Source	in-fobank.az	Portal: MALIYY SAVADLIL-IGI Por-	Portal: cbar.az	Portal: Adif
11	Rabita Bank	link	Easy to scrape, scroll down from home page	azn.az (listed as Rabitabank on azn.day.az)	yes	yes	yes	yes
12	TuranBank	link	Easy to scrape, scroll down from home page	both	yes	yes	yes	yes
13	Unibank	link	Easy to scrape, scroll down from home page	both	yes	yes	yes	yes and egov
14	Yapi Kredi Bank Azerbaijan	link	Easy from dedicated page	both	yes	yea	not sure	not sure
15	Bank Melli Iran	link	Easy to scrape, scroll down from home page	azn.day.az	yes	not sure	not sure	yes and egov

index	Bank	Link	Scrape?	Original Source	Portal: in-fobank.az	Portal: MALIYY SAVADLIL-IGI		
						Por-	Portal: cbar.az	Portal: Adif
16	Yelo Bank	link	checks if human or bot. Easy from dedicated page	azn.day.az	yes	not sure does include karabakh life re-vival fundation	not sure does include foundation	yes and egov
17	Azer Turk Bank	link	Easy to scrape, scroll down from home page	azn.day.az	Easy to scrape, scroll down from home page	yes	not sure	yes
18	Express Bank	link	need to click currency rate in the home page no dedicated page	azn.day.az	yes	yes	not sure	yes and egov
19	Bank BTB	link	might need javascript to load	azn.day.az	yes	yes	not sure	yes and egov

index	Bank	Link	Scrape?	Original Source	Portal: in-fobank.az	Portal: MALIYY SAVADLIL-IGI Por-	Portal: cbar.az	Portal: Adif
20	Ziraat Bank	link	Easy to scrape, scroll down from home page	azn.day.az	yes	yes	not sure	not sure

## 6.2. Technical Prototype

The first iteration focused on developing a basic prototype application that provides users with static generated exchange rate data, a bilingual interface, and a basic map demonstrating Google API functionality.

The development team drew inspiration for the data stack and backend architecture from the CM2040 Databases, Networks and the Web midterm project. They structured the technical components as follows:

Category	Technology	Description
<b>Backend</b>	Node.js	Runtime environment for building server-side applications.
	Express.js	Web application framework for routing and HTTP handling.
	SQLite	Lightweight, file-based SQL database for data storage.
<b>Frontend</b>	EJS	Server-side rendering of HTML templates for dynamic content.
	CSS	Stylesheets for visual design using <code>main.css</code> .
<b>Development Tools</b>	Body-Parser	Middleware for parsing incoming request bodies (e.g., forms).
	NPM Scripts	Custom scripts for managing the app and database operations.
<b>Directory Structure</b>	Routes	Separate modules for author, reader, and main routes.
	Views	EJS templates for different pages (e.g., homepage, settings).

The project structure was organized into several key components. For the frontend, the team implemented HTML with EJS (Embedded JavaScript Templates) to display exchange rates in a table format and integrate a Google Maps component centered on Baku. The backend was built using Node.js with the Express.js framework to serve dynamic content through GET endpoints and manage translations via JavaScript files. The Google Maps API was incorporated as a third-party service to provide map visualization capabilities.

The complete technology stack was organized as follows:

Layer	Technology	Purpose
<b>Frontend</b>	HTML, EJS	Display data, multilingual UI
<b>Backend</b>	Node.js, Express.js	Serve content, handle routes
<b>Database</b>	None	Not used yet; future for data storage
<b>APIs</b>	Google Maps API	Map visualization
<b>Languages</b>	JavaScript	Backend and frontend functionality

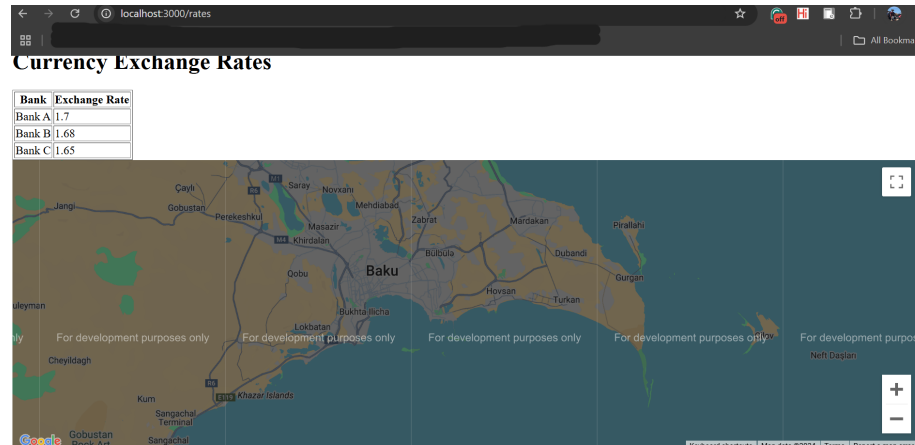


Figure 8: iteration1\_screenshot

For the next iteration, the development team plans to implement a language switcher with links for changing languages, enabling a dynamic multilingual interface that supports English, Russian, and Azerbaijani. They also aim to enhance the Google Maps integration to display bank locations on the map.

### 6.3. Wire Frames

**6.3.1. Iteration 1 Home Page Wireframe** The first iteration's wireframe for the home page focuses on providing a clear overview of exchange rates across



multiple banks in Baku. The design follows a tabular layout similar to existing platforms like `azn.day.az` and `azn.az`, but with improvements for clarity and usability.

The main interface displays a comprehensive table showing exchange rates for multiple banks. For each bank, the table includes:

- Bank name for clear identification
- Buy and sell rates for cash transactions
- Buy and sell rates for non-cash (card/electronic) transactions

This layout allows users to quickly compare rates across different banks at a glance. The table format was chosen because:

1. It provides a familiar interface that users already understand from existing platforms
2. It enables easy scanning and comparison of rates across multiple banks
3. It efficiently uses screen space to display a large amount of numerical data

The wireframe demonstrates how the application will present essential information without overwhelming users. Each row represents a different bank, with columns clearly labeled for different transaction types. This organization helps users quickly find the most favorable rates for their specific needs, whether they're looking for cash or non-cash transactions.

The design prioritizes readability and ease of comparison, addressing a key user need identified in our market research - the ability to efficiently compare rates across multiple banks without needing to visit multiple websites or locations.

+-----+   [Home] [About] [Contact]   +-----+				
Bank Exchange Rates Table				
+-----+				
Bank Name	Buy Rate	Sell Rate	Type	
+-----+				
Bank A	1.70	1.72	Cash	
Bank B	1.68	1.71	Non-Cash	
+-----+				
+-----+				
Footer: Contact Info   Social Media Links				
+-----+				

**Bank Details Page Wireframe** A second wireframe shows the individual bank view, which will be accessible when users click on a specific bank. This detailed view includes:

- Bank name and branding
- Detailed bank information

- Current exchange rates
- Google Maps integration showing branch locations

Currency Exchange Navigator	[Home]	[About]	[Contact]
Bank A			
Bank Name	Buy Rate	Sell Rate	Type
Bank A	1.70	1.72	Cash
Address: 123 Main St, Baku, Azerbaijan Phone: +994 12 3456789 Email: info@banka.az Website: www.banka.az			
Hours of operation: 9:00 AM - 5:00 PM			
Map showing nearby branches			
Footer: Contact Info   Social Media Links			

The second iteration’s wireframe for the individual bank view focuses on providing a detailed view of a specific bank’s exchange rates and location. The design includes:

**6.3.2. Iteration 2** In the first iteration we focused on the home page and the bank details page. In the second iteration we focused on the language switcher and the map.

### Home Page Wireframe

[Home]	[About]	[Contact]	[Language: EN]
Bank Exchange Rates Table			

Bank Name	Buy Rate	Sell Rate	Type
Bank A	1.70	1.72	Cash
Bank B	1.68	1.71	Non-Cash

Footer: Contact Info | Social Media Links | Feedback

### Bank Details Page Wireframe

Currency Exchange Navigator					<a href="#">[Home]</a>	<a href="#">[About]</a>	<a href="#">[Contact]</a>	<a href="#">[Language: EN]</a>
Bank A								
Bank Name	Buy Rate	Sell Rate	Type					
Bank A	1.70	1.72	Cash					
Address: 123 Main St, Baku, Azerbaijan								
Phone: +994 12 3456789								
Email: info@banka.az								
Website: www.banka.az								
Hours of operation: 9:00 AM - 5:00 PM								
Map showing nearby branches								
Footer: Contact Info   Social Media Links   Feedback								

**6.3.3. Iteration 3** For the third iteration we focused on improving the table layout for the rates

### Home Page Wireframe

Currency Exchange Navigator		[Home]	[About]	[Contact]
Bank Exchange Rates Table				
Bank Name	Cash Buy Rate (AZN/USD)	Cash Sell Rate (AZN/USD)	Non-Cash Buy Rate (AZN/USD)	
Access Bank	1.70	1.72	1.69	
AFB Bank	1.68	1.71	1.67	
International Bank	1.69	1.73	1.68	
Premium Bank	1.67	1.70	1.66	
Footer: Contact Info   Social Media Links   Feedback				

The table now includes both cash and non-cash rates for each bank, providing users with a complete view of available options.

### Bank Details Page Wireframe

Currency Exchange Navigator [Home] [About] [Contact] [Language: EN]				
Bank A				
Bank Name	Buy Rate	Sell Rate	Type	
Bank A	1.70	1.72	Cash	
Address: 123 Main St, Baku, Azerbaijan				
Phone: +994 12 3456789				
Email: info@banka.az				
Website: www.banka.az				
Hours of operation: 9:00 AM - 5:00 PM				
[Interactive Map with Branch Locations]				
- Clickable markers for each branch				
- Route planning options				
- Filter branches by criteria				

```

| +-----+
|
+-----+
| Footer: Contact Info | Social Media Links | Feedback | Accessibility |
+-----+

```

Using the Google Maps API to implement the map feature. This API provides tools for adding interactive markers, route planning, and real-time updates.

- Interactive Markers: Add markers for each bank branch. When clicked, these markers should display a pop-up with detailed branch information.
- Route Planning: Integrate Google Maps Directions API to provide users with route options to their selected branch, considering traffic conditions.
- Filter Options: Implement a filtering system that allows users to narrow down branches based on their preferences.

## 7. Questionnaire

1/1/25, 5:10 PM

Currency Exchange Navigator Stakeholder Questionnaire

### Currency Exchange Navigator Stakeholder Questionnaire

[Sign in to Google](#) to save your progress. [Learn more](#)

\* Indicates required question

What is your primary role? \*

- ☐ Local resident of Baku
- ☐ Tourist
- ☐ Small or Medium Enterprise (SME) representative
- ☐ Other:

How often do you need to exchange currency? \*

- ☐ Daily
- ☐ Weekly
- ☐ Monthly
- ☐ Occasionally
- ☐ Other:

1/1/25, 5:10 PM

Currency Exchange Navigator Stakeholder Questionnaire

What is your primary mode of transportation in Baku? \*

- ☐ Personal car
- ☐ Public transportation
- ☐ Walking
- ☐ Other:

How do you currently find exchange rates? \*

- ☐ Online websites (e.g., [azn.az](#), [azn.day.az](#))
- ☐ Visiting bank branches directly
- ☐ Recommendations from others
- ☐ TV/Street Advertisement
- ☐ Social Media
- ☐ Google/Yandex Search
- ☐ Other:

What challenges do you face in finding the best exchange rates? \*

- ☐ Lack of up-to-date information
- ☐ Inconvenience of visiting multiple locations
- ☐ Unclear transaction limits or fees
- ☐ Safety/Security
- ☐ Other:

file:///C:/Users/swans/Desktop/Currency Exchange Navigator Stakeholder Questionnaire.htm

1/7

file:///C:/Users/swans/Desktop/Currency Exchange Navigator Stakeholder Questionnaire.htm

1/1/25, 5:10 PM

Currency Exchange Navigator Stakeholder Questionnaire

Do you rely on geolocation tools to find nearby bank branches? \*

- ☐ Yes
- ☐ No
- ☐ Sometimes
- ☐ Other:

For tourists: Do you find it difficult to locate trustworthy currency exchange offices in Baku?

- ☐ Yes
- ☐ No
- ☐ I am not a tourist

Which of the following features would you find most useful in a currency exchange app? (Select all that apply) \*

- ☐ Real-time exchange rate comparison
- ☐ Geolocation to find nearby exchange offices
- ☐ Information on transaction limits and fees
- ☐ Office hours and availability

1/1/25, 5:10 PM

Currency Exchange Navigator Stakeholder Questionnaire

Would you use a feature that provides safety tips for tourists using a currency exchange?

- ☐ Yes
- ☐ No
- ☐ Other:

For SMEs: Would real-time exchange rate data help optimize currency transactions?

- ☐ Yes
- ☐ No
- ☐ Not applicable

What is your preferred platform for using this service? \*

- ☐ Mobile app
- ☐ Web-based platform (accessible through browsers)
- ☐ Both
- ☐ Other:

1/1/25, 5:10 PM Currency Exchange Navigator Stakeholder Questionnaire

**Would you prefer a lightweight tool without the need for downloading an app?**

☐ Yes

☐ No

☐ Both

**Do you have concerns about sharing your geolocation data? \***

☐ Yes

☐ No

☐ Other:

**What improvements would you suggest for existing currency exchange platforms? \***

Your answer

**If you could change one thing about the currency exchange experience in Baku, what would it be? \***

Your answer

**Any additional comments or suggestions? \***

Your answer

file:///C:/Users/s/wans/Desktop/Currency Exchange Navigator Stakeholder Questionnaire.htm 5/7

## 7.1. Visualized Results From Questionnaire

### 7.1.1. Questionnaire Results: Primary Role

### 7.1.2. Questionnaire Results: How often do you need to exchange currency?

### 7.1.3. Questionnaire Results: What is your primary mode of transportation in Baku?

### 7.1.4. Questionnaire Results: How do you currently find exchange rates?

What is your primary role?

16 ОТВЕТОВ

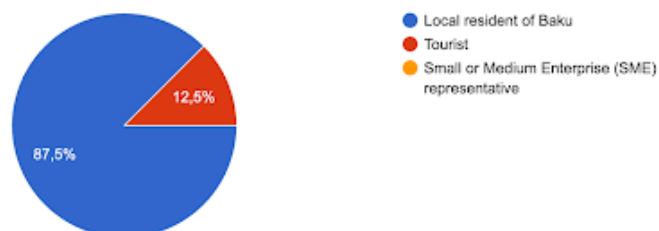


Figure 9: Questionnaire Results: Primary Role

How often do you need to exchange currency?

16 ОТВЕТОВ

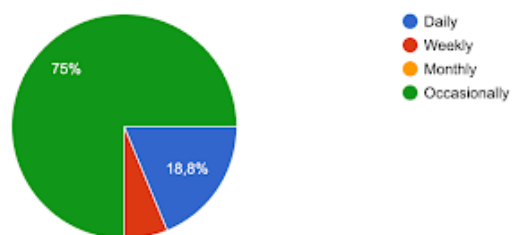


Figure 10: Questionnaire Results: How often do you need to exchange currency?

What is your primary mode of transportation in Baku?

16 ОТВЕТОВ

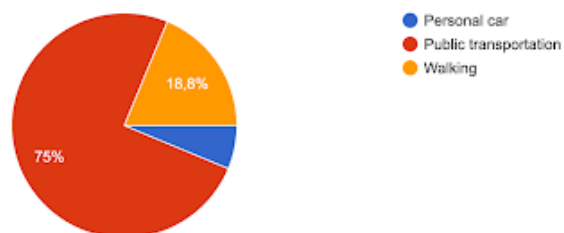


Figure 11: Questionnaire Results What is your primary mode of transportation in Baku?:



#### How do you currently find exchange rates?

16 отбелок

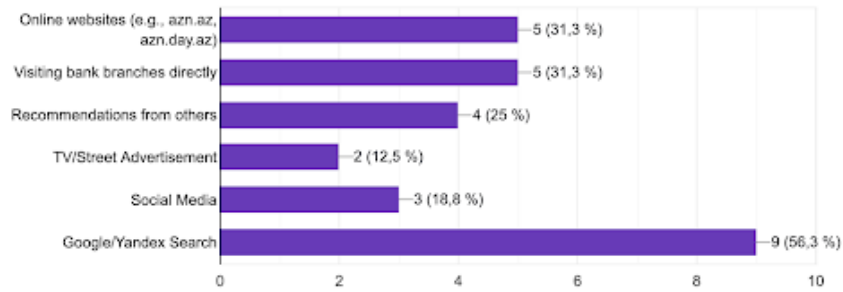


Figure 12: Questionnaire Results: How do you currently find exchange rates?

#### What challenges do you face in finding the best exchange rates?

16 отбелок

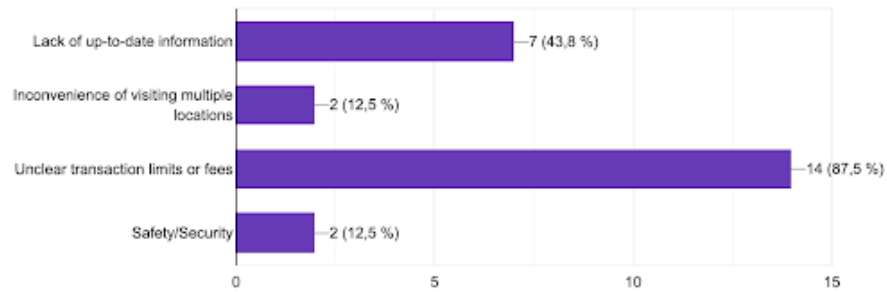


Figure 13: Questionnaire Results: What challenges do you face in finding the best exchange rates?

#### 7.1.5. Questionnaire Results: What challenges do you face in finding the best exchange rates?

Do you rely on geolocation tools to find nearby bank branches?

16 ОТВЕТОВ

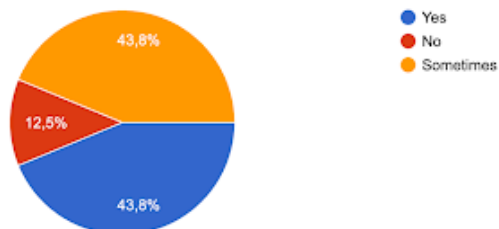


Figure 14: Questionnaire Results: Do you rely on geolocation tools to find nearby bank branches?

#### 7.1.6. Questionnaire Results: Do you rely on geolocation tools to find nearby bank branches?

For tourists: Do you find it difficult to locate trustworthy currency exchange offices in Baku?

14 ОТВЕТОВ

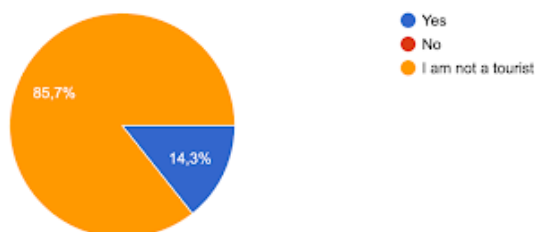


Figure 15: Questionnaire Results: Do tourists find it difficult to locate trustworthy currency exchange offices in Baku?

#### 7.1.7. Questionnaire Results: Do tourists find it difficult to locate trustworthy currency exchange offices in Baku?

#### 7.1.8. Questionnaire Results: Which of the following features would you find most useful in a currency exchange app?

Which of the following features would you find most useful in a currency exchange app? (Select all that apply)

16 ОТВЕТОВ

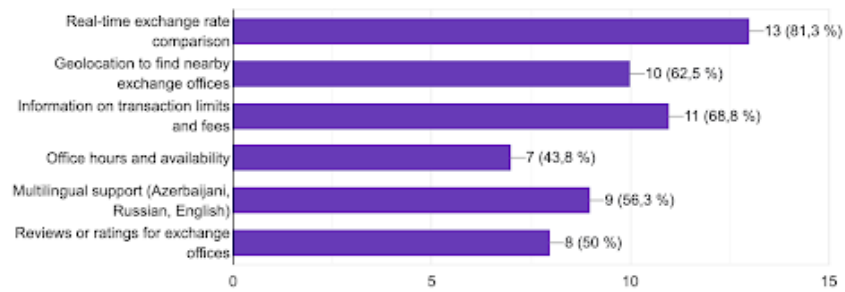


Figure 16: Questionnaire Results:

Would you use a feature that provides safety tips for tourists regarding currency exchange?

16 ОТВЕТОВ

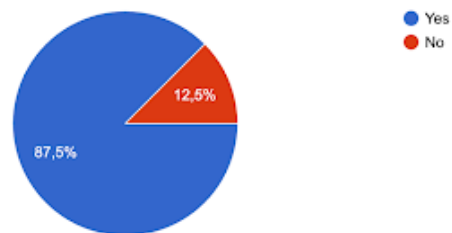


Figure 17: Questionnaire Results:

**7.1.9. Questionnaire Results: Would you use a feature that provides safety tips for tourists regarding currency exchange?**

For SMEs: Would real-time exchange rate data help optimize your foreign currency transactions?  
12 ОТВЕТОВ

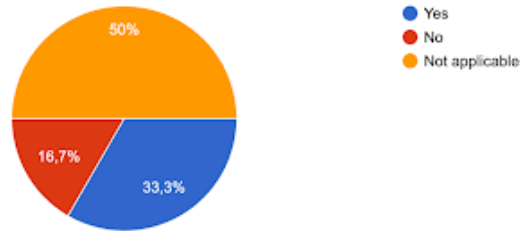


Figure 18: Questionnaire Results:

**7.1.10. Questionnaire Results: For SMEs, would Real-time exchange rate data help optimize your foreign currency transactions?**

What is your preferred platform for using this service?  
16 ОТВЕТОВ

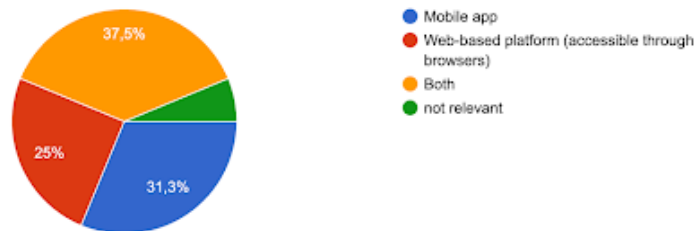


Figure 19: Questionnaire Results:

**7.1.11. Questionnaire Results: What is your preferred platform for using this service?**

**7.1.12. Questionnaire Results: Would you prefer a lightweight tool without the need for downloading an app?**

**7.1.13. Questionnaire Results: Do you have concerns about sharing your geolocation data?**

Would you prefer a lightweight tool without the need for downloading an app?

16 ОТВЕТОВ

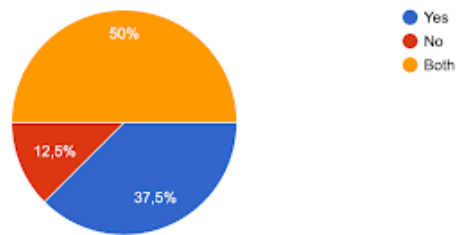


Figure 20: Questionnaire Results:

Do you have concerns about sharing your geolocation data?

16 ОТВЕТОВ

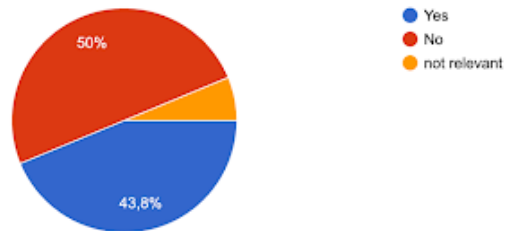


Figure 21: Questionnaire Results:

## **7.2. Insights From Questionnaire**

The questionnaire results revealed several key challenges faced by users in the currency exchange market. A significant portion (43.8%) of respondents reported difficulties with accessing up-to-date information, while an overwhelming majority (87.5%) expressed concerns about unclear transaction limits and fees. Finding nearby branches proved to be a universal challenge for tourists, with 100% reporting this as an issue. Additionally, 87.5% of respondents indicated a need for safety tips when conducting currency exchanges. These findings highlight critical gaps in the current market offerings, particularly regarding user-friendly, real-time, and accessible solutions. The results were especially telling among tourists, who strongly emphasized their need for both safety guidance and reliable service information. These insights demonstrate a clear opportunity for our application to address these unmet needs in the currency exchange service landscape.

## **8. Technical and functional specification**

### **8.1. Technical Stack**

We will build our app using React for the front-end (what users see) and NestJS for the back-end (the server side). React helps us create web pages that update smoothly without refreshing. We'll use common React tools like React Router to handle page navigation and Material-UI to make the app look good. We'll also add Google Maps to show bank locations on a map.

The back-end will use NestJS because it helps us write clean, organized code. We'll store our data in a PostgreSQL database, which is good for keeping track of things like bank information and user accounts. To make the app faster, we'll use Redis to temporarily store information that people look up often, like exchange rates.

For getting currency exchange rates, we want to use data from infobank.az. If we can't get permission to use their data directly, we have a backup plan. We'll use Python programs to automatically collect the information from their website. This would happen regularly to keep our rates up to date.

### **8.2. Functional Specification**

The main features of the app will be: - See current exchange rates - Look up bank locations on a map - Get directions to banks - Save their favorite banks - Write reviews about banks - Report wrong information

The app will work in three languages - Azerbaijani, Russian, and English. Users can pick which one they want to use. They can also choose which currencies they want to track and get notifications when rates change.

### 8.3. Database Design

Our database schema will consist of several tables to store information about banks, exchange rates, and related data:

---

Banks
bank_id (PK)
name
phone
opening_hours
website
email
branch_id (FK)

---

---

Branches
branch_id (PK)
bank_id (FK)
address
latitude
longitude
phone
opening_hours

---

---

Exchange_Rates
rate_id (PK)
bank_id (FK)
currency_id (FK)
buy_cash_rate
sell_cash_rate
buy_non_cash_rate
sell_non_cash_rate
last_updated

---

---

Currencies
currency_id (PK)
name
symbol

---

Users
user_id (PK)
email
password
preferred_currency_id (FK)
preferred_bank_id (FK)
preferred_language_id (FK)

Reviews
review_id (PK)
bank_id (FK)
user_id (FK)
rating
comment
created_at

Key relationships: - Each bank can have multiple exchange rates (one-to-many)  
- Exchange rates reference specific currencies (many-to-one) - Users can leave multiple reviews for banks (many-to-many)

## 9. Planning

Effective project planning is crucial for ensuring that all team members are aligned and that the project progresses smoothly. For our project, we utilized slack for communication and GitHub for project management.

In the begging our team members ranged from the Central Europe, Western Asia, Eastern Asia, and North America. Thus we deemed the difficulty in finding a common time for a weekly Zoom or Discord meeting would be insurmountable. We thus opted for the more flexible approach, using Slack for communication.

This provided convience but at the expsence of a more structured approach. In the end this proved to be a problem as we had trouble keeping track of our tasks and progress.

We also lost afew team memebbers durring the project. One of the members never enaged throughout the project, and another was actualy in the wrong team.

We established a dedicated channel, team-35-tutor-group-8\_cm2020, to central-ize all project-related discussions. This channel was created on November 11th, 2024, and served as the primary hub for communication among team members.

We created a GitHub project to track and assign issues. This allowed us to manage tasks effectively, ensuring that each team member was aware of their responsibilities and the project's status.



Using the GitHub project we created a timeline for the project. This timeline was used to allocate time effectively across different project phases. While we occasionally exceeded our estimated time frames, the flexibility in our planning allowed us to adjust as needed based on the depth of research required.

Our GitHub repository served as the central hub for all project-related documents and code. The repository was organized into several key sections:

- **Concept and Aims:** Documented two weeks ago, outlining the project’s objectives and goals
- **Stakeholder Analysis:** Completed two weeks ago, including a comprehensive SWOT analysis
- **Product Research:** Compiled up to social factors, with updates as recent as five hours ago
- **Technical and Functional Specifications:** Wireframes for both the main page and bank info page were completed last week
- **Final Report:** The PESTEL analysis was fully integrated into the final report five hours ago

## 10. References

1. The Trade Finance Guide, U.S. Department of Commerce, [www.trade.gov/sites/default/files/2022-07/Trade\\_Finance\\_Guide\\_2022.pdf](http://www.trade.gov/sites/default/files/2022-07/Trade_Finance_Guide_2022.pdf). Accessed 5 Dec. 2024.
2. “Azerbaijan: Freedom on the Net 2024 Country Report.” Freedom House, [freedomhouse.org/country/azerbaijan/freedom-net/2024](https://freedomhouse.org/country/azerbaijan/freedom-net/2024). Accessed 23 Dec. 2024.
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