BNA Online Optimization

System Request and Feasibility Study / Planning Phase   
(Homework No.1B)

Project team: Team 10

Instructor: Dr. Araz Yusubov

Submitted in partial fulfillment of the requirements of the INFT 2303: Systems Analysis and Design course project

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| --- | --- |
| GitHub repository | https://github.com/ADA-SITE-INFT2303-2022-Spring/systems-development-project-team-10 |
| Version date | Version information |
| 21.02.2022 | Initial draft |
| 22.02.2022 | Added Introduction part |
| 22.02.2022 | Added Feasibility Analysis. |
| 22.02.2022 | Added Overall description |
| 22.02.2022 | Finished version 1 |
| 25.03.2022 | Finished version 2 |

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| Team member | Contribution to this homework (NOT the project) | Estimated % |
| Farhad Khidirli | User Characteristics, Constraints, Assumptions and Dependencies. Revised and improved to version 2 | 25 % |
| Bakhtiyar Guluzade | Product perspective, product functions | 25 % |
| Kanan Ibrahimli | introduction part, Organizational feasibility | 25 % |
| Kanan Gafarov | Technical feasibility, Economic feasibility | 25 % |

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# Introduction

This is part of the System Proposal for a hypothetical project BNA Optimization system submitted for partial fulfillment of the requirements of the Systems Analysis and Design course in the School of Information Technologies and Engineering at ADA University, Baku, Azerbaijan.

List of individual System Request:

1. Centralized health database by Kanan Gafarov
2. Online Canteen by Kanan Ibrahimli
3. BNA Optimization by Farhad Khidirli
4. Bravo supermarket optimization by Bakhtiyar Guluzade

As a final decision, we selected the project offered by Farhad Khidirli because there is huge need for improvement in this field, the percentage of risk is low, and it covers much broader scopes. It seems very beneficial from the passenger's perspective. However, we need more resources to build such a system in every public transport that uses “Baku Card”. As a result, public transport can give an excellent service.

The content of the document includes overall description of the system which covers the perspective and functions of the product, user characteristics, constraints, assumptions, dependencies, and the feasibility analysis. Generally, this document is about planning phase of BNA Optimization System.

## Definitions

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| --- | --- |
| Term | Definition |
| Baku Card  Baku Bus  OS  Apple Pay  Google Pay  Google Play  App Store  AZN | Baku Card is a usual card needed for paying public transport fare in Azerbaijan.  Baku Bus is a company in the capital of Azerbaijan providing Baku city with an upgraded bus network.  An Operating System (OS) is an interface between a computer user and computer hardware.  Apple Pay is a mobile payment and digital wallet service by Apple Inc. that allows users to make payments in person, in iOS apps, and on the web using Safari. It is supported on the iPhone, Apple Watch, iPad, and Mac.  Google Pay is a digital wallet platform and online payment system developed by Google to power in-app, online, and in-person contactless purchases on mobile devices, enabling users to make payments with Android phones, tablets, or watches.  Google Play, also branded as the Google Play Store and formerly Android Market, is a digital distribution service operated and developed by Google for Android OS.  An app store is a type of digital distribution platform for computer software called applications, often in a mobile context for IOS.  AZN is a local currency in Azerbaijan. |

# Overall Description

## Product Perspective

~~Similar to “Baki Kart” in Europe people can buy tickets by using apps or Google Pay, Apple Pay, and other methods to use public transportation. If we can make this method popular among citizens, then it will be productive as the European method. They built an automatic system (app or site) for paying transport costs. For example, in Germany there is an app for public transport it is very convenient to use. Even elder people learned it because of the education from the German government.~~

## The advanced countries of Europe and America consider public transport one of the most important factors for the comfort and practicality of both the population and the ecology of the country. In addition, public transport should be accessible to tourists as well as citizens of the country, which means it should be easy to use and adapt. In addition, people have a choice of different fares and payment options. Considering that in Azerbaijan only one payment method is possible with the Baku Bus system - with a plastic card Baku Card, our project is aimed at facilitating the replenishment of this card. More specifically, the goal is to create an online mobile system for replenishing the card quickly, simply and conveniently.

Chart, waterfall chart

Description automatically generated

Figure 1 - Traditional terminal replenishment

Graphical user interface, text, application

Description automatically generated

Figure 2 - Online Baku Card replenishment via website

## Product Functions

* The system must allow registered customers to top-up “Baku Card” balance and review their own payment history for past month.
* The system must allow customer to top-up “Baku Card” balance throughout mobile application.
* ~~The system should allow customer to use monthly loan of 0.3azn.~~
* The system should provide a choice for customer to how balance should be topped-up (*Apple Pay / Google Pay / Manually)*
* The application must allow customer to check current balance on “Baku Card.”
* The application should be available, stable, and working 24/7 online.

## User Characteristics

The target user must:

Have basic experience using mobile phone and payment applications.

Have a mobile phone with access to internet.

Have a “Baku Card” and additionally debit card to use application.

Be willing to share information such as phone number / email address and Name & Surname.

Be at least 18 years old to use this application.

## Constraints

* The application will run both on Android and IOS mobile devices (On the first stage of production placed Android OS).
* The system should be able to work with existing Transport Agency Core system.
* The application must be available both on Google Play and App Store.
* The system response to the client should be no later than 1.5 seconds.
* The system supports 2500 simultaneous users basically; from 6:00 PM to 8:00 PM and from 6:00 AM to 9:00 AM – 5000 simultaneous users should be managed.
* Client’s personal information will be secured.
* Payments throughout *Apple Pay / Google Pay / Manual online payment* will be secured.
* The application should be in AZN currency.

## Assumptions and Dependencies

The idea is built on the fact that would speed up and facilitate the process, therefore, the presence of a bank card is necessary for online replenishment.

If there is a need to distribute the application on Windows systems, the usage policy will be changed accordingly.

In addition, to use the mobile application, you need to register an account (account). There will be two available registration methods via phone number and email. So, user must have local phone number or working email address.

In order to fully use the functions of the application, the user should have “Baku Card”

# Feasibility Analysis

**Technical feasibility:**

As it was mentioned in System Request, it is already possible to top up your “Baku Card’s” online the system is already familiar to the developers of the system.

When it comes to users’ familiarity with the technology, in our project’s case no problems are going to occur since we do not intend to remove an old system where you simply put your card in the machine and upload how much money you want. This project’s intention is to add a new, more modern, and faster way of replenishing the balance, an app, where you replenish your balance through your credit card. So, we believe that there should not be a problem with users’ familiarity with the applications and low risks for technology familiarity.

The project’s size is medium, mainly because the online payment system (website) already exists. Moreover, the project’s risk decreases because there is not very urgent need to add new system. However, the systems need to be optimized towards transaction processing speed and improved UX & UI. The first and more influential addition to the system is the minimization of card replenishment time for the convenience of the user. The second equally important factor is the simplification of card replenishment with the integration of storing digital cards (Apple Pay, Google Pay).

As for compatibility with an already existing online system, there will be no compatibility. Since the online payment system is also an integrated system, not a root one. The root system of this project is the server itself, which participates in replenishing the card through the metro terminal. Since we will be working on optimization and adding to the root system, a new one integrated to perform functions on the same principle, it means that there should be no problems with compatibility.

**Economic feasibility:**

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| --- | --- | --- | --- | --- | --- | --- |
| **Hardware** | **Salary expenses for Implementation** | **Salary expenses for Analysis and Design** | **Office equipment and extras** | **Annual Cost for Staff’s labor and trainings** | **Annual Cost for Licenses and Hardware Upgrades** | **Annual Increased Revenue** |
| 13000 ₼ | 65,000 ₼ | 9,000 ₼ | 3,500 ₼ | 10,000-12,000 ₼ | 5,500 ₼ | 8%+ |

Since our project relates to governmental structure and there is no official information about the annual turnover of vehicles operating in the "Baku Bus” system, it is impossible to make accurate calculations. The only thing you can find out is to understand the benefits of this project based on a survey and your own experiment. After all, any project must begin with a need, and I believe that most of the people of Azerbaijan need it.

**Total Development Cost:** 13,000 + 65,000 + 9,000 + 3,500 = 90,500

**Total Operational Cost**: ± (10,000 – 12,000 + 5,500) \* 3 = 49,500

**Total Cost**: 140,000

**Total Benefits**: B = 8% \* X where X is annual turnover of “Baku Bus” system.

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| --- | --- | --- | --- | --- |
| **Year 0** | **Year 1** | **Year 2** | **Year 3** | **Total** |
| -140,000 ₼ | B – 15,500 ₼ | B – 16,500 ₼ | B – 17,500 ₼ | B \* 3 – 49,500 ₼ |

**Cumulative Net Cash Flow**: (B – 90,500 – 15,500) / (B – 15,500)

**Return on Investment** (ROI) =

**Break-Even Point** (BEP) =

**Present Value** (PV):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Year 0** | **Year 1** | **Year 2** | **Year 3** | **Total** |
| Total Benefits | 0 | B | B + B \* 0,08 | B + B \* 0,08 + (B \* 0,08 \* 0,08) |  |
| PV of Total Benefits | 0 | B / (1+0.08) | B + B \* 0,08 / (1 + 0.08)^2 | B + B \* 0,08 + (B \* 0,08 \* 0,08) / (1+0.08)^3 |  |
| Total Costs | 90,500 | 15,500 | 16,500 | 17,500 | 49500 |
| PV of Total Costs | 90,500 | 14352 | 14146 | 13892 | 132890 |

With the help of this analysis, we took the average statistics of a person who travels and returns in one direction for one month (60 times), as well as the statistical average of cases (5 times) when he had to order a taxi or walk home due to problems with the terminal. Calculating this as a percentage, we can roughly say that there will be an 8 percent increase in profits.

**Organizational feasibility:**

As it was mentioned before, current users of public transport in Baku are not going to stop from using it since the old ways of replenishing their cards will be still working. However, the fact that new choices will be introduced may sway many users to using them. Websites and apps where people pay their bills online have been introduced several years ago, Apple Pay has been introduced recently as well. Population of Baku keeps catching up with modern trends and more and more people start using technology to ease their lives. Replenishing their cards with the help of an app is just one of those trends that is going to replace the current ways in the future. And hypothetically, more people will try it out after hearing about it. Furthermore, the project is strategically aligned with the business since its purpose is the same: online replenishment of public transport access cards as fast as possible.

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