

Applying augmented reality and gamification in point system interface design

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Abstract

Point system is structured marketing strategy offered by merchants to encourage consumers to continue to buy goods or pay for the services. According to the degree of contribution to merchants, merchants give consumers a certain amount of points as reward. These points can be exchanged into a good or service but not back into cash. However, as a result of the decrease in the rate of reduction, the attraction of point system to consumers goes down, especially in the case of micropayment. This paper calls for the design of innovative technologies to provide consumers with value guidance and improve use intention, e.g., by applying gamification and AR technique. In this paper, we propose several concepts like reward, feedback, achievement and competition. Points, mission, badges and level will be adopted in interface design. Some mission for promoting consumers' motivation like living a healthy life, protecting environment and promoting local economy will be proposed to provide them consultable measures of value. If consumers succeed in completing the mission, they can get points in reward. Badges represent achievement. Consumers can earn badges by reaching achievement. Levels are used for competition between consumers. They can also check account, consumer level, achievement and daily mission completion freely.

Keywords: E-commerce, Augmented Reality, Gamification

1 Introduction

Point system can distribute or assign points to consumers according to their purchase of goods or service in the shop. Premiums are items that a retail consumer can receive by redeeming proofs of purchase from a specific product or store. This was one of the first loyalty marketing programs.

In November 1983, "JAL Mileage Bank USA" was born in the United States. In January 1993 it was launched in Japan, giving miles to customers who took an airplane and JAL travel tickets as gifts according to miles [1].

From the latter half of the 1990's, consumers could use electronic money. The use of electronic money solves the problems caused by the use of bank notes and coins and prompted convenience and certainty. In 1997, Coca-Cola offered buying from vending machines using mobile payments [2]. After that PayPal emerged in 1998 [3]. However, the point bubble began to collapse at the same time. Since 2001, the European Union has implemented the E-Money Directive "on the taking up, pursuit and prudential supervision of the business of electronic money institutions" last amended in 2009 [4]. In the United States, electronic money is governed by Article 4A of the Uniform Commercial Code for wholesale transactions and the Electronic Fund Transfer Act for consumer transactions. In Japan, there was the revised wage business law established in December 2006. The point program was revised and the exchange rate of miles and points changed. The rate of reduction shrank as a result so that it is difficult to accumulate points.

Since then, the point system which was considered as a very important marketing tool has entered a bottleneck period.

2 Background

2.1 Problem

Since the point program in recent years has a lower reduction rate compared with the peak period, making points harder to accumulate than before. As a result, it

seems that consumers are paying less attention to the point program and companies complain that these point programs discount goods to people that are buying their goods anyway, and that the expense of doing these programs rarely shows a good return on the investment. Therefore, the first problem we want to solve is how to attract people to participate into the use of point program.

On the other hand, a 2015 study claimed that most supermarket loyalty cards do not offer any real value to their customers [5]. Therefore, second problem is that how to provide real value to customers.

In this paper, our research tries to solve these two problems. We will try to provide a new game-like shopping experience to attract people to participate in the consumption which can give good return on companies' investment. What's more, we also try to provide customers with real value.

2.2 Related Approach

For the two problems we mentioned above, there are some related marketing strategies.

Shoppers prefer the allure of a different currency than what they are used to. Giving them some name that matches brand and what is sold is considered a good solution. For example Starbucks' program calls their currency stars. Novelty can make program more enticing which appeals to customers.

Referral programs [6] are an excellent way to attract new customers. For example, offer patrons a discount if they refer somebody. The person who is referred gets to enjoy the same discount too.

Social media contests [7] are also one of efficient way of attracting new clients such as hosting a Facebook contest or a Facebook giveaway. Some free points, a tier upgrade, or another redeemable reward are adopted to make the offer more appealing.

Nowadays, many people will spend money on a brand only if they know some of their money is going to a worthy

cause. They are particularly passionate about doing business only with brands that want to make a difference by donating to a cause. One solution is to create or adjust program to ensure that a part of the profits is donated to a cause, or run a marketing campaign for certain products or services which advertise that business will donate some of the money to charity [8].

In conclusion, novelty, reward, competition and a worthy cause are important factors in solving similar problem in other situation.

2.3 Our Approach

As demonstrated by related approach, novelty, reward, competition and a worthy cause are adopted in the interface design based on current point system. But different from solving the problem by only marketing strategy adjustment, our research tries to applying these marketing strategies into the interface design of current point system.

Reward and competition factors are included in gamification techniques. We try to apply gamification into our research. We use rewards for players who accomplish desired mission to engage players. Types of rewards include points [9], achievement badges or levels [10] and the filling of a progress bar. Making the rewards for accomplishing tasks visible to other players or providing leader boards are ways of encouraging players to compete [11]. Thus we use AR technology to make the point system visible which also meets public desire of novelty. In our research, badges are used to indicate the status of achievement. The filling of progress bar indicates the completion degree of mission. Level is used as to evaluate competition. Points are used as reward of accomplishing mission.

Mission and achievement are adopted to provide real value to customers. Some missions for promoting consumers' motivation such as living a healthy life, protecting environment and promoting local economy will be proposed. If consumers succeed in completing the mission, they can get points in reward.

In the research, we try to apply gamification into the new interface design to solve the two problems and improve the convenience of micropayment. AR is used as tool to realize visualization. As it is totally a brand new experiment in e-commerce field, we evaluate our research result and draw some conclusion.

Game design mechanisms are used for larger goal and reward states, including mission, achievement and competitions. Mission involves completion of a set of actions that follow a particular order or path. It is about exploration and discovery. Competitions are events that encourage rivalry for honor. Achievements that communicate high scores or other numbers might anchor a player's expectations about what is a reasonable score to shoot for.

Feedback mechanics include points, levels, badges. Points are values awarded for an action or a combination of actions. Based on particular user scenarios, points can contribute to other game mechanics, such as levels, leaderboards, or virtual economies. Levels reward those accumulating points and reflect that a user is improving or continuing to show the desired behavior. The goal is to motivate users by rewarding them for continued improvement and participation. Badges, which are tokens that reward users for specific behaviors, are some of the most visible elements of gamification because they confer status.

Indicators include mechanics that define a user's relative position such as time and position in the system or in relationship to others. Indicator mechanisms include progression.

3 System

3.1 Overview

The system consists of two parts. One part is the consumer part and the other is the merchant part. At the consumer side, they can use the camera on the smartphones or smart glasses to recognize the AR marker and start system. By using system, they can pay point, check account, level, achievement and daily mission completion. At the merchant side, merchant can confirm the mission and deposit the spare coins for consumers.

3.2 Consumer Module

Main interface

As it is the main entrance of system, point, mission, achievement, level and pay button are distributed. We create some models to represent these elements in interface layout.

The main interface designed is shown as Figure 1. There are piggy model, coin model, star pattern, badge and pay button on main interface. Piggy model represents consumer's account. Piggy bank is usually used for storing small changes, which is similar to storing points in consumer's account. Coin model represents point. Because of protecting the privacy of consumer's account, using coin model can prevent accessing point directly. Each star pattern corresponds to one mission and the color of pattern indicates the progress degree of mission. Badges are located in the upper right corner of main interface. The brightness of the badge indicates whether the achievement has been achieved or not. When consumers want to deal with payment, they can click pay button.



Figure 1: Main interface

Mission Interface

Consumers can see the state of mission by looking at its color. If the mission button is entirely white, it means that the mission has not yet begun. If consumer clicks the mission button, consumer can see the mission content at the top left corner of the interface.

If the mission button is partially yellow, it means that the mission is in progress. If consumer clicks the mission button which is partially yellow, consumer can see the mission content and progress of mission at the top left corner of the interface.

If the mission button is entirely yellow, it means that the mission has been completed. If consumer clicks the mission button which is entirely yellow, consumer can see

congratulations message at the top left corner of the interface.

Table 1: Mission design

Number	Mission Content	Points
1	Confirm point	1pt
2	Buy eco-friendly goods	1pt
3	Buy local goods	1pt
4	Buy low calorie goods	1pt
5	Take public transport or walk	1pt
6	Not use disposable goods	1pt
7	Buy 1 item	1pt
8	Buy 5 items	1pt
9	Buy 10 items	1pt

In our research, mission is daily task for consumers to get points with their own effort. For consumers, if they want to get more points, they need to promote self-motivation to do something useful for themselves or society. The content of mission can be well designed to guide consumers' value orientation. The correspondence between number and mission is shown as Table 1.

The color of star pattern reflects the degree of completion, which is thought as progress bar in gamification strategy. By clicking the different star pattern, consumers can see different information corresponds to different mission information.

Point Confirm Interface

When consumer touches the coin model, account points will be displayed at the upper left corner of the interface. In this interface, we design way of displaying account point.

Point is used as a way of reward. If consumers complete daily mission, they can get points. This game mechanism is used to inspire the motivation of consumers to perform daily tasks. In the Table 1, we design the mission content and assign each mission with one point. That means if consumer completes one daily mission, they can get one point in reward. The more daily mission they accomplish, the more points they will get. These points can be used to purchase. It makes consumers feel they get reward by their effort.

We can view the point in account by clicking the coin model. The design of coin model can prevent the information leakage to some extent. Points are used as reward of effort.

Micropayment Interface

When consumer clicks the pay button, they can choose how many point they want to use by clicking button with coin image at the upper left corner of the interface. They can click different buttons for any times and sum will be calculated. If they press the wrong button, they can reset the points by clicking clean button. If they decide to pay, they can click ok button to confirm payment. This interface is for micropayment. Consumers can choose to pay for the change part. We believe this helps to increase transaction convenience.

Achievement Interface

If consumer clicks the dim achievement badge, the content of achievement will be displayed at upper left corner of interface. If consumer clicks the light badge, congratulation information will be displayed. In this interface, we design the achievement goals contents for consumers to achieve.

Table 2: Badges and achievements

Number	Badge	Achievement
1		Created new account
2		Buy eco-friendly goods consecutively for 30 days
3		Buy local goods consecutively for 30 days
4		Buy low calorie goods consecutively for 30 days
5		Take public transport or walk consecutively for 30 days
6		Not use disposable goods consecutively for 30 days

Badge is displayed to indicate achievement. Each achievement corresponds to one badge. Consumers can click badge to see the content of corresponding achievement. According to the achieving degree, the brightness of badge will be modified. If consumers achieve success in one field, the badge will be lightened. We try to make the feedback visible to improve the consumer's sense of self satisfaction. The correspondence between badges and achievements is shown as Table 2.

There are two stages of achievement. The color of badge reflects the degree of completion. Consumers can click the badge to see detailed information about achievement.

Level Interface

If consumer clicks the piggy model, the level information will be displayed at upper left corner of interface. In this interface, we give level information to consumers for the purpose of competition.

Level is used to compete with others. If consumers fulfill mission or achievement, they can gain EXP. If EXP is enough, account level will be upgraded. It helps to stimulate willingness to accomplish mission and achievement.

In this interface, consumer can click piggy model and use the level information to compete with others. Consumer with higher level can achieve a sense of achievement while consumer with lower level will try to improve rating.

3.3 Merchant Module

Main Interface

The interface before deposit is shown as Figure 2. The merchant interface is slightly different from the consumers'. Merchant can confirm mission and deposit changes while they cannot see the account information.

In this interface, we assign different operation authority to merchant and we want merchant to act as the regulators of consumers.



Figure 2: Main interface

Deposit Interface

Merchant is given the right of distributing points to consumers. When merchant clicks the pay button, merchant can choose how many points consumer want to deposit by clicking button with coin image at the upper left corner of the interface. If they press the wrong button, they can reset the points by clicking clean button. If consumer decides to deposit, merchant can click ok button to confirm deposit.

Mission Confirm Interface

Merchant is thought to be the regulators of mission confirm. If merchant clicks the confirm button, he or she can confirm the daily mission for consumers. Once merchant clicks the confirm button, there will be 9 buttons that represent different tasks at the top left corner of the interface. If consumer finishes mission, merchant can click the mission number and give points to consumer.

By clicking confirm button, merchant can help consumers confirm daily mission and give them points as reward. Merchant will become the witnesses of consumers' success in finishing mission and achievement.

4 System Implementation

Development Environment

We develop this system using Unity 5.6.0. Because it is an Android system, we use Android SDK and use Redmi HM 1S as terminal. The Android version of Redmi terminal is 4.4.4 KTU84P and MIUI version is MIUI 7.5.1.0 (KHCCNDE). As for Unity AR programming, we use Vuforia as SDK. Windows 10 computer is used.

5 Evaluation

We conducted a first questionnaire survey about point system in physical store. The subjects of the questionnaire are ten students aged around twenty-two years old. There are several questions in the questionnaire. The first question is that have you ever experienced point system? The second question is that do you have a membership card? The third question is that have you paid attention to point system? The results from first questionnaire show that all of them experienced shopping with point system. But only 60% students have at least one point card. Some of them also said they did not pay attention to point system before our questionnaire because they thought it was not so much useful.

Then we asked them to use our system to simulate the shopping experience. After that, we conducted a new questionnaire to evaluate our research result. There are also several questions in the new questionnaire. The first question is that this system and the current point system which do you prefer? The second question is that would

you like to use it daily? 90% of them showed considerable interest in our system because they thought this game-like shopping mode is very interesting and the visual interfaces give them the sense of intimacy. They thought getting point from doing something which is useful is a way to kill two birds with one stone and they fulfilled their tasks with satisfaction that they had never had before.

According to system test result and the two questionnaires, we think the two problems which is mention in the problem part can be greatly improved or solved to some extent. By applying the gamification strategy into the interface design, the attractiveness of point system is improved because more people would like to have a try despite of unattractive reduction rate. Consumers can get satisfaction by getting reward from doing something meaningful.

6 Conclusions

In this research, we analyze the present problem in point system. One is lack of attraction and the other is that customers cannot get real value from it. In order to solve these problems and promote the optimization of point system in the future, we find some marketing strategies and try to apply them into the new interface design of current point system. AR and gamification are adopted as solution to design and implement the system.

In proposed interfaces, game mechanisms like feedback, reward and competition are adopted. To realize that, badge and point are used to indicate reward, AR is used to show feedback and level is used to show competition. In addition, we try to enhance user motivation to live eco-friendly and healthy life as real value.

In the future, we will enrich the content of animation and try to introduce SNS as a competitive approach. According to different tasks and different achievement, the system will show different animation effects, which will improve their sense of achievement. In addition, increasing the interaction between users and develop their sense of competition through SNS is also considered very meaningful.

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