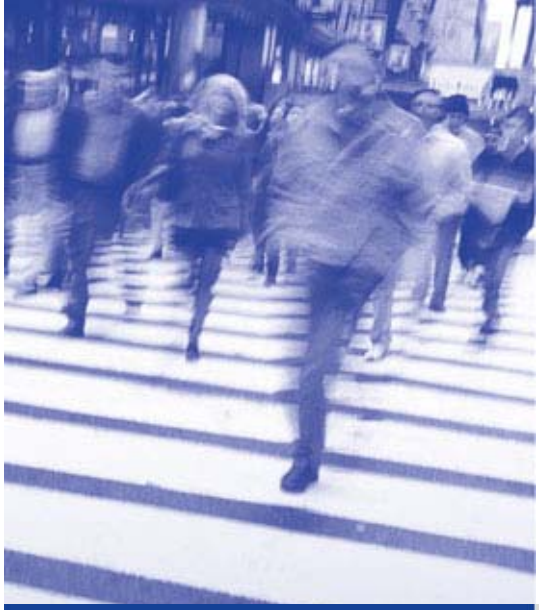

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Measure Evaluation Results

BOL 2.4 Recharging System for Season Tickets on Contactless Smart Cards

Armandi Mirco
Cocchi Daniela
(TPER)

Date: February 2013

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Executive Summary

The measure aims to provide an alternative and flexible ticketing system to public transport users in Bologna. The measure was developed in the context of the new fare and ticketing system introduced on January 2010. The new ticketing system is based on contactless smart cards for season tickets and magnetic technology for other tickets. One of the key aspects for the success of such a system is the creation of a widespread network of recharging points for season tickets cards. With this measure the city of Bologna intended to implement a recharging service available at self-service points of banks and post offices that are already used in every day life and familiar to citizens.

The present measure is strongly interdependent with two others MIMOSA measures BOL 2.1 'Integrated PT Fare System' and BOL 3.3 'New Regulation in Pedestrian Areas in City Centre'. Indeed, the aim of the contactless smart card "MI MUOVO" is to provide access to a range of mobility facilities with one single card. This card can be used as public transport ticket, electronic pillars release (for registered residents of semi-pedestrian areas), car sharing and parking payments card.

This measure was implemented in five stages:

Stage 1: Feasibility study and executive plan (June 10 – November 10) The first step was to establish contact with the bank circuits in order to evaluate the feasibility of the system. Banks showed high interest to participate in the measure. The implementation plan was developed in a collaborative work between TPER and bank technicians.

Stage 2: Implementation and demonstration (November 10- September 11) The software was developed and tested. The first recharging points were installed in the banks of Unicredit spa. The system started at the end of August 2011 coinciding with the period of renewal of most season tickets.

Stage 3: Information Campaign (July 11- October 11) An information campaign was launched to promote the new system. It was addressed to season ticket holders through a wide range of information channels (letters, email, internet platform, posters in busses, etc). The system was an immediate success: about 25% of the contactless smart card were recharged with this new system.

Stage 4: Spread of the system (October 11- October 12) 313 additional recharging points were installed in the city of Bologna and in the Province in cooperation with the INTESA-San Paolo bank. The extension of the system is currently in process.

Stage 5: Realization of the web application (July 12 – September 12) An online application was developed which allows customers to recharge their season tickets directly on the transport company website using a credit card. The service is operating since September 2012.

With regard to evaluation, the economic and social aspect of the measure were considered. This took into account costs for investment and maintenance of the new system as well as cost savings due to the reduction of sales staff in ticket offices: a reduction of about 11,75% of the sales staff annual cost were observed after the introduction of the new service.

The evaluation of social aspects of the system (awareness and acceptance) were assessed through a telephone survey of a sample of 500 season ticket holders: 250 tusers of the new recharging service and 250 non-users The sample was chosen among people living in Bologna and Province. Two relevant outcomes were highlighted by the surveys. First, season ticket holders that used the service expressed a very positive opinion on the new service offered and consider it convenient and time saving. Secondly, most season ticket

holders who never used the recharging service were not aware of this new service. This feedback pointed out the necessity to further investigate why the information did not reach them and how to communicate in a more efficient way.

The main **barrier** was in the preparation phase due to the difficulty in cooperating and sharing solutions with banks because of their own safety and security requirements. A **driver** for the operation phase was that citizens were already familiar with ATM banks since they get money and recharge their mobile phones with the self service machine. This familiarity facilitated the use of the new functionality for recharging season tickets.

Two main **recommendations** are proposed to implement a similar measure in other cities. First, a precondition to implement a similar measure is the presence of an electronic ticketing system. Secondly, a strong commitment on the part of banks is necessary to work out solutions based around a financial sector characterized by high security policies, private protocols and strict certification procedures.

In the future it is planned to install additional channels to increase the recharge point network. Possible ideas are tobacconist shops as well as contacting big chains of supermarkets to recharge the ticket directly at the cash desks.

A Introduction

A1 Objectives

High level objectives:

- Increase modal split towards sustainable modes: increase the use of public transport service (bus and train)

Strategic measure objectives:

- Collective passenger transport: increase the quality of public transport service

Specific measure objectives:

- Increase number of recharging points of season tickets on contactless smartcard
- Improve the service creating a network of self service ticketing points where users can recharge their tickets every day/24 hours.

A2 Description

This measure was developed in the context of the new fare and ticketing system. The new ticketing system is based on contactless smart cards for season tickets and magnetic technology for the other tickets. One of the key aspects for the success of such a system is the creation of a widespread network of recharging points for season tickets cards. With this measure we intended to implement a recharging service available at self-service points of banks and post offices that are already used in every day life and familiar to citizens.

We started with contacts with the bank circuits in order to evaluate the feasibility of the system and we found great interest for this new system.

After the feasibility study we continued with the implementation and launched the system in September 2011 coinciding with the renewal period for most season tickets (in September the holiday period ends and the school year starts so students and workers renew their season tickets).

The system was launched with an information campaign addressed to all season tickets holders.

The system was immediately a big success: about 25% of the season tickets that could be renewed without going to the ticket office were recharged with this new system.

After the start of the system with Unicredit spa we extended the system to other banks (INTESA-San Paolo).

The service is also available on the Web allowing customers to renew their season tickets through the transport company web site using a credit card. The web service has been operating from September 2012.

B Measure Implementation

B1 Innovative Aspects

Use of new technology: This is an innovative service for the recharge of season tickets through self service points of banks and post offices. It's the first application of this kind concerning public transport in Italy.

B2 Research and Technology Development

The R&D activitiy of this measure consisted in the analysis of the feasibility of the system. We developed it in cooperation with banks: it contains the analysis of security and privacy issues, the system architecture and the user interface.

The project R&D activity developed together with technicians of banks aimed to find the best architecture to integrate the ATMs with the TPER informative system. In particular the following ICT (Information and Communication Technologies) activities were carried out:

- implementation and update of the software of ATMs
- creation of a dedicated environment for the management of transactions related to transport
- study of a secure connection VPN to link the bank and TPER
- study of an application to interface TPER database with the bank application
- monitoring system to control ticket recharges
- creation of data flow for the accounting system

All activities were developed respecting the procedures, certifications and security protocols of the banks.
The outcome of the R&D activity was very positive also for the great interest that banks demonstrated for this new service for their clients.

B3 Situation before CIVITAS

Before the implementation of the new recharge system, the annual season tickets could only be renewed at TPER ticket offices. This implied that all season tickets holders of the whole Bologna Province had to come to Bologna to renew their annual season ticket (in 2009 about 50.500 annual season tickets for the urban and extra-urban service were issued).

This obligation caused discomfort for the users, especially through the long queues at the ticket offices during the period of major renewal (end August and September) in combination with the limited opening time of the ticket offices

B4 Actual Implementation of the Measure

Stage 1: Feasibility study and executive plan *(June 10 – Nov 10)* technical analysis and cooperation with banks to realize the feasibility study and implementation plan.

Stage 2: Implementation and demonstration *(Nov 10- Sept 11)***:**

The software has been developed and tested. Officially the system started at the end of August 2011: the recharge of annual season tickets is operative on the Automatic Teller Machines of Unicredit one of the main national banks.

Fig. B4.1 – ATM with the new application for recharging tickets

Stage 3: Information Campaign *(Jul 11- Oct 11)***:**

An information campaign was launched to promote the new system: it was addressed to season ticket holders through different information channels:

- directly at home with information material (about 30.000 letters sent to annual season ticket holders)
- on the buses and at the bus stops with information poster (about 3.500 posters)
- through e-mails to the users registered to the TPER info-mail service (about 2.000 mails)
- through TPER official web site: http://www.atc.bo.it/ricarica
- through Regione Emilia Romagna web site: http://mobilita.regione.emilia-romagna.it/mi-muovo-1
- articles in newspapers

Stage 4: Spread of the system *(Oct 11- October 12)***:**

After the start of the system with Unicredit spa we extended the system to other banks (INTESA-San Paolo). There are 313 ATMs in Bologna and Province running with the recharge application.

After starting the system with the two main banks in Bologna, we are trying to agree the service extension with minor banks.

Stage 5: Realization of the web application *(July 12 – September 12)*

The application was developed also for the Web allowing customers to renew their season tickets through the transport company web site using a credit card. The service has been operating from September 2012.

B5 Inter-Relationships with Other Measures

This measure is related to measure 2.1”Integrated PT fare system” that developed the information campaign and dissemination related to the implementation of the new fare and ticketing system based on smart cards.

One of the key aspects for the success of the new ticketing and fare system is the creation of a widespread network of recharging points for season tickets cards.

C Impact Evaluation Findings

C1 Measurement Methodology

C1.1 Impacts and Indicators

Table C1.1.1: Indicators.

Evaluation area	Evaluation category	Impact	No.	Indicator	Source of data	Month
Economy	Benefits	Operating Revenues	1	Operating revenues	Sales data	Before: - After: 45
	Costs	Capital Costs	2	Investment Costs	TPER costs	Before: - After: 42
		Maintenance Costs	3	Maintenance cost	TPER costs	Before: - After: 42
		Operating costs	4	Operational costs of ticket offices	TPER costs	Before: - After: 42
Society	Acceptance	Awareness	5	Awareness level	Surveys to season ticket holders by a specialized company	42
		Acceptance	6	Acceptance level	Surveys to season ticket holders by a specialized company	42

The realization of this new recharging system aims to:

- create a widespread network of recharging points for season tickets to cover all the transport service basin of the Bologna Province.
- improve the quality of the service offered to season tickets holders allowing them to recharge their season tickets without the obligation to go to the ticket offices
- decrease in the costs for the ticket office personnel thanks to the decrease in the stream of customers at the ticket office desks.

Below you can find the description of the indicators we used to evaluate the results of the measure.

Indicator 1-4 “Economical evaluation area”:

The economical evaluation was done using investment costs for the realization of the new service and also considering revenues as well as maintenance costs.

We measured also operational costs of ticket offices in order to evaluate if the introduction of the ATMs self-service recharge allowed a cost saving in terms of personnel of the ticket offices.

Indicator 5-6 "Society evaluation area"

In order to evaluate society indicators we conducted one telephone survey with a sample of 500 season tickets holders: 250 that used the new recharging service and 250 that didn't use it. The sample was chosen among people living in Bologna and in the other small towns of the Province. The survey was done in May 2012.

- The aim of the survey was to evaluate among people that used the service:
  - the quality perceived in terms of personal use and in general for the users of public transport
  - the possible difficulties found in using the system
  - the opinion on the costs of the service.
- The aim of the survey among people that didn't use the recharging service was to evaluate:
  - if they know the service
  - the reason why they didn't use it
  - their opinion in general on the system
  - the possibility that they use the service in future

C1.2 Establishing a Baseline

Before the system development, passengers had the possibility to renew annual season tickets only at ticket offices. Feedbacks from users and ticket office operators pointed out the need to widen the network of ticketing points to renew season tickets.

C1.3 Building the Business-As-Usual Scenario

Without the realization of the new recharge service through the bank ATMs each public transport customers (from the whole Bologna Province) would be obliged to go to the ticket offices in Bologna to renew the season ticket.

The realization of the recharging system at bank ATMs is only possible if the transport company has an electronic ticketing system that allows, after the payment at ATMs, to use the validator on the bus to recharge the season ticket smart card. In Bologna we started with the new electronic fare and ticketing system in January 2011 (see also measure 2.1).

As concerns the specific indicators used for evaluation:

- the service given to customers would have been limited to traditional ticket offices and as a consequence the quality and the perception of the service would have been lower.
- we would not have any saving in personnel costs of the ticket offices.

C2 Measure Results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport.

C2.1 Economy

Indicator n. 1: **Operating revenues**

The launch of the system was a great success: it started at the end of August 2011 at the beginning of the period of major renewal of annual season tickets.

Recharge data say that about 25% of the season tickets that could be renewed without going to the ticket office were recharged with this new system.

Some season tickets cannot be recharged through ATMs:

- New season tickets (card issue needed)
- Change of the season ticket characteristics
- Subsidized season tickets that need specific documents to be presented
- Mobility management season tickets that are directly issued by the companies

Table C2.1.1. shows the number of tickets and the total amount of recharges through ATMs from the start of the service until September 2012.

Table C2.1.1. Season tickets recharged through ATMS (Total number and amount in euro since the system started)

Months	Number of tickets	Total amount
Aug-11	18	€ 4.713,00
Sept-11	1.741	€ 486.115,00
Oct-11	733	€ 196.544,00
Nov-11	209	€ 56.150,00
Dec-11	281	€ 79.714,00
Jan-12	151	€ 43.427,00
Feb-12	63	€ 17.877,00
Mar-12	58	€ 16.556,00
Apr-12	45	€ 12.733,00
May-12	21	€ 6.212,00
Jun-12	18	€ 4.984,00
Jul-12	8	€ 2.427,00
Aug-12	108	€ 31.363,00
Sept-12	2.182	€ 661.671,00
Total	**5.636**	**€ 1.620.486,00**

Fig. C2.1.1 Number of tickets recharged per months

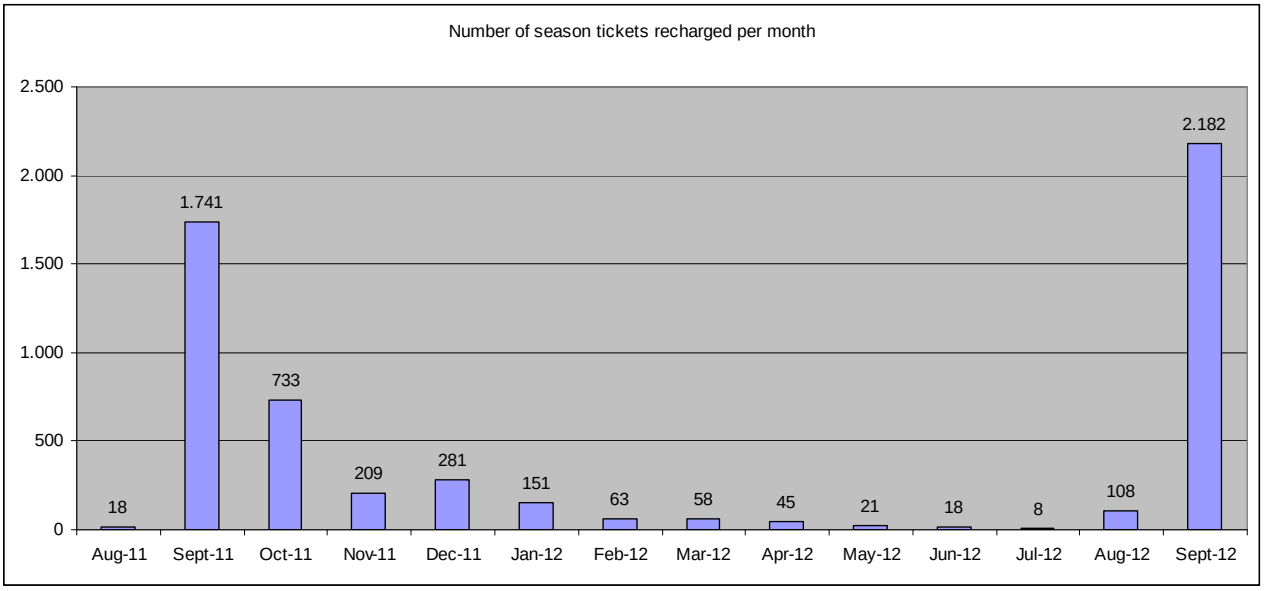


Fig. C2.1.1 clearly shows the fluctuation in the recharging during the year. This is due to the fact that the greater part of annual sesaon tickets are renewed in September and October when students start schools and university.

Indicator n. 2: Investment costs; Indicator n. 3: Maintenance costs; Indicator n. 4: Operational costs of ticket offices (in Euro)

Table C2.1.2. Investments and maintenance costs of the new recharge system per year

	2009	**2010**	**2011**	**2012**
Realization of the ATMs recharge service	-	-	36.000	
Maintenance costs	-	-	2.000	6.000
Operational costs of ticket offices			-11,75%	-11,75%

Table C2.1.2 shows the investment and maintenance cost for the implementation and operation of the system.

The new system had a positive impact on the operational costs of the ticket offices: we registered a saving in personnel of 4.360 hours/per year equivalent to about 100.000,00 euro (11,75% of the total personnel costs of the ticket offices).

C2.2 Energy

Not applicable

C2.3 Environment

Not applicable

C2.4 Transport

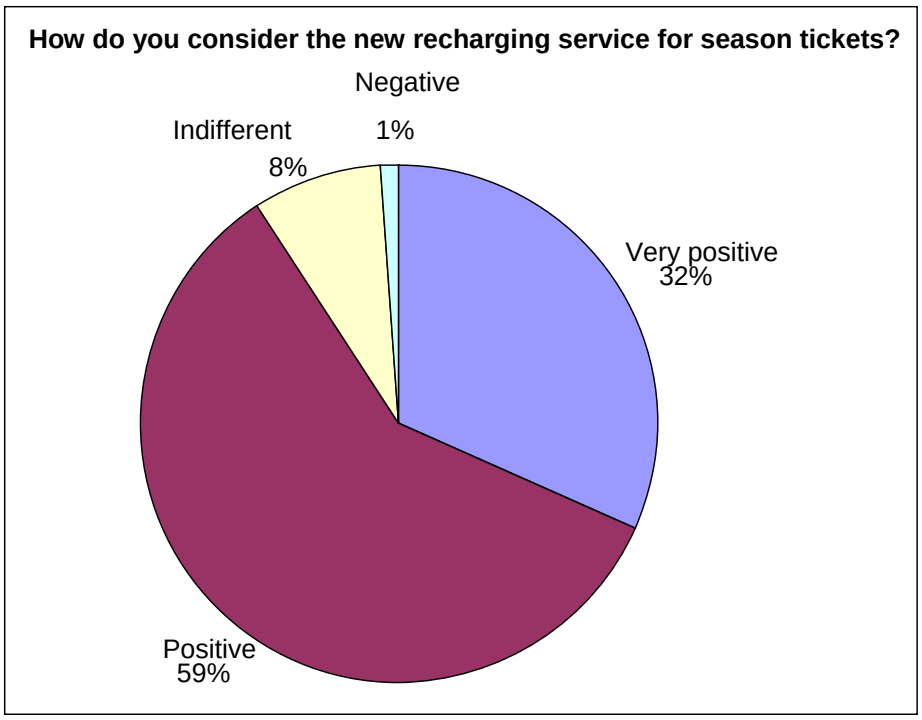
Not applicable

C2.5 Society

Indicator 5-6 "Society evaluation area"

The feedback of the survey among **season ticket holders that used the new recharging service** was very encouraging: about 91% of the sample considers positively the introduction of the service (32% very positive and 59% positive). (see Fig.C2.5.1)

Fig. C2.5.1 – Service acceptance (sample: 250 people that used the recharge service)



The survey demonstrated that the choice to use automatic teller machines already familiar to people that use it for other services was very successful. More than 96% found no difficulty in using the recharging service (see table C2.5.1).

Table C2.5.1 - Opinion on system use (1/2)

Did you find any difficulties in recharging the ticket through ATMs?	%
Yes, many	0,4
Yes, some	3,6
No	96,0
Total	100,0

Also the first validation of the season ticket on board didn't pose any relevant problem: about 87% of users didn't find any difficulty (see table C2.5.2).

Table C2.5.2 - Opinion on system use (2/2)

Did you find any difficulties in validating the ticket on board?	%
Yes	6,3
No	87,3
I didn't do it, I didn't know it was necessary to validate on board	6,3
Total	100,0

The recharge service foresees an extra cost (bank charges) of 2,50 euro for each season ticket (2,00 euro for tickets under 200,00 euro). We asked customers how do they consider this extra-cost.

The answers confirmed that service is very valuable for users: 53% consider the charge reasonable for the advantages in terms of time saving and convenience (see table C2.5.3).

Table C2.5.3 - Opinion on the service cost

How do you evaluate the bank charges requested for the service?	%
Reasonable, because it gives the possibility to recharge at ATMs without queuing at ticket offices	52,8
Too high	7,1
No bank charges should be requested for the service	40,1
Totale	100,0

The perception on the service is very positive: more than 70% of users said that it facilitates their personal use of transport service; in other words the recharge through ATMs is a relevant improvement in the quality of the transport service offered. (see table C2.5.4)

Table C2.5.4 – Impact on the interviewed transport use

Do you think that this service facilitates YOUR use of public transport?	%
Yes	70,24
No	23,41
I don't know	6,35
Total	100,0

The perception on the service is very positive: more than 70% of users said that it facilitates their personal use of transport service; in other words the recharge trough ATMs is a relevant improvement in the quality of the transport service offered. (see table C2.5.5)

Table C2.5.5 – Impact on the general transport use

Do you think that this service facilitates IN GENERAL the use of public transport and increases it?	%
Yes	65,08
No	26,98
I don't know	7,94
Total	100,0

In table C2.5.6 shows that the information on the new service was spread through different channels that reached season ticket holders. From the answers it seems that information on newspapers did not reach the citizens: this could be because of the difficulties to highlight the information among news, publicity, advice,…

Table C2.5.6 – Information channels

How did you know of the possibility to renew the season ticket through ATMs?	%
Information material sent at home/through e-mail	35,3
Information on the bus	27,0
Articles on newspapers	5,2
Transport company web site	32,5
Total	100,0

The answers to the final question confirmed success of the service: about 81% of users confirmed that they will use the same service next year. (see table C2.5.7)

Table C2.5.7 – Future use

Will you use the ATMs recharge next year?	%
Yes	80,95
No	5,16
I don't know	13,89
Total	100,0

Answers from season **ticket holders that didn't use the new recharging service** demonstrated that they didn't know about the system (see table C2.5.8).

Table C2.5.8 – Knowledge of the service among people that didn't use it (sample: 250)

Do you know about the new ticket recharge service through ATMs?	%
Yes	34,0
No	66,0
Total	100,0

With the question reported in fig. C2.5.2 we asked people who knew about the service why they didn't use it. Also from these answers it appeared clear that the information concerning the new service didn't reach the season ticket holders in an efficient way.

This feedback is very useful for the realization of next information campaign for season tickets renewal: we should investigate why such relevant percentage of users didn't get the information on the service and try to improve our information actions.

Fig. C2.5.2 – Main reasons for which people didn't use it

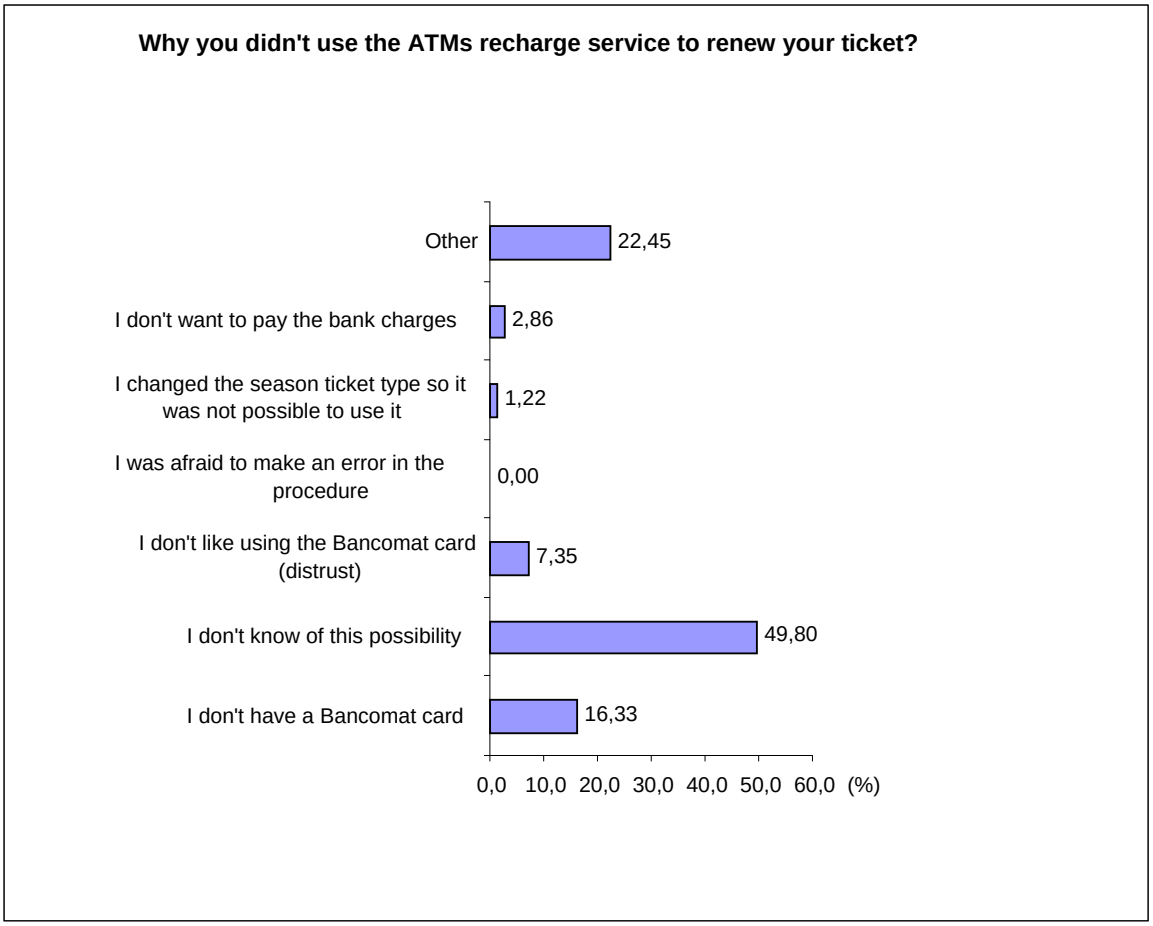


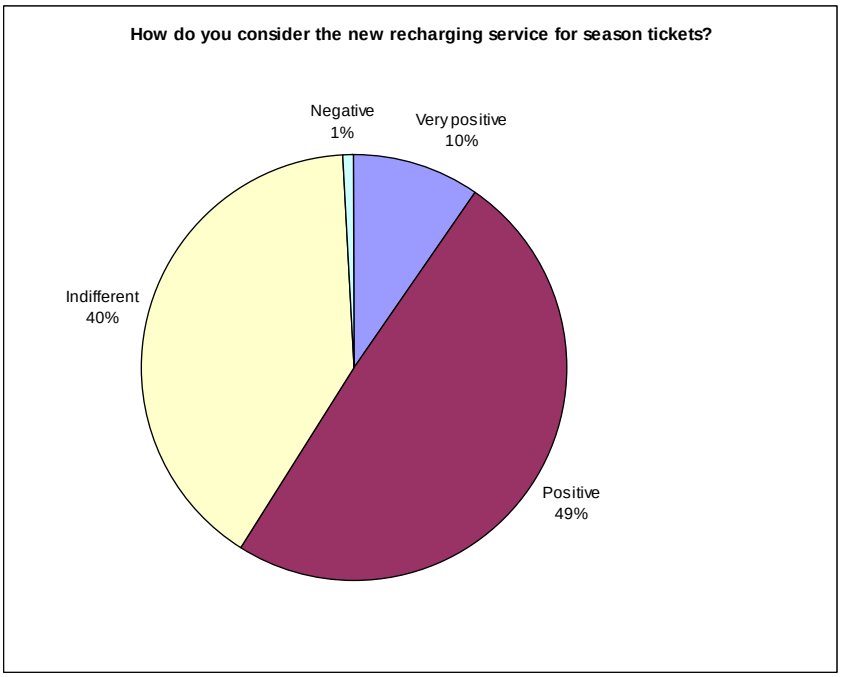
Table C2.5.9 shows the detail of the group "Other" of fig. C2.5.2

Table C2.5.9 – "Others reasons" analysis

Other reasons	**%**
I don't need the annual season ticket any more	38,2
I have a season ticket within mobility management agreement	20,0
I prefer to go to the ticket office	12,7
I changed ticket type (from the annual season ticket to another ticket)	9,1
Renewed through the municipality office	5,5
I don't have renewed the ticket yet	7,3
I need the invoice	1,8
I don't know the service	1,8
Other	3,6
Total	**100,0**

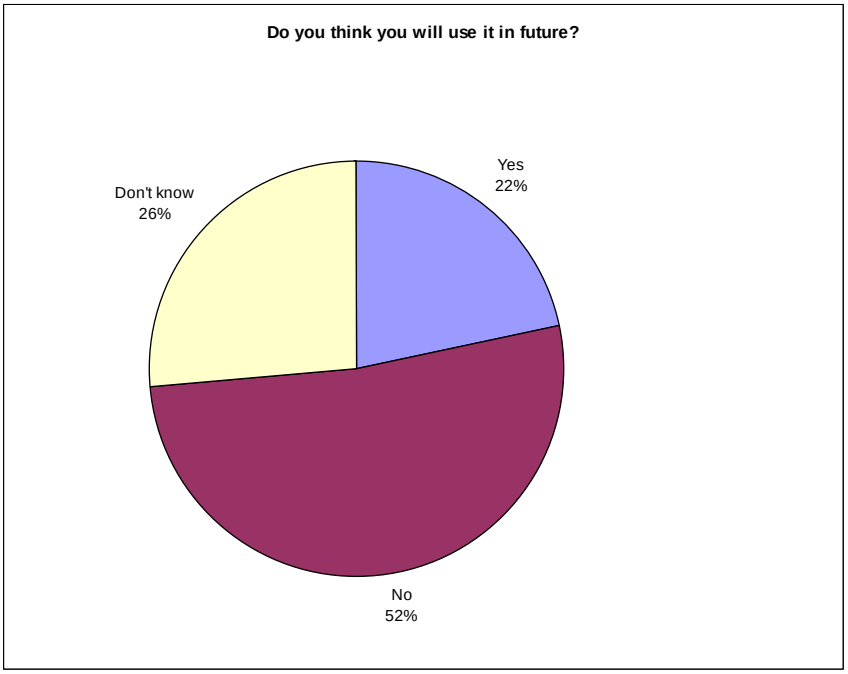
After the explanation of the service we asked respondents how do they consider this system and about 60% answered positively; a significant percentage of 40% is indifferent to this new service (See fig. C2.5.3).

Fig. C2.5.3 – Service acceptance (people that didn't use it)



Finally we asked people if they think they will use the service in future: 22% answered positively, 26% is undecided while 52% will not use it. This demonstrated there is a good potential for the service growth: about a half of people that didn't use the system before are ready (after an appropriate information campaign) to use the ATMs recharge service (see fig. C2.5.4).

Fig. C2.5.4 – Future use (people that didn't use it)



C3 Achievement of Quantifiable Targets and Objectives

No.	Target	Rating
1	Increase number of recharging points of season tickets on contactless smartcard	**
2	Improve the service offered, facilitate transport users in recharging their cards	**

NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%)
**** = Achieved in full *** = Exceeded**

The success of the system is related to the extremely widespread network of ATMs (about 313 ATMs in Bologna and Province) opened every day 24 hours.

C4 Up-Scaling of Results

A first upscale of the system will be the extension of self service points with agreement with other banks operating in Bologna Province.

A second upscale will be the extension to the whole Regione Emilia Romagna: the new fare and ticketing system with smart card season tickets is going to be expanded in the whole Regione Emilia Romagna to all transport modes (bus and train). It' s reasonable to expect that also the recharge system through self service points will be extended to the whole Region.

C5 Appraisal of Evaluation Approach

We didn't find particular problems in the evaluation phase: the new system was evaluated considering the number of tickets recharged and the opinions of citizens collected with the survey.

A further analysis would have been useful in order to understand why there is a relevant percentage of season ticket holders that didn't know about the system.

C6 Summary of Evaluation Results

Results concerning the use of the system are very positive (see point C2). The survey demonstrated that season tickets holder appreciated the new service offered and consider it convenient and time saving (they can recharge the ticket when they want in several points in their city). From the survey we perceived a difficulty in the information campaign in that it did not reach all users.

C7 Future Activities Relating to the Measure

We are trying to find other channels to increase the recharge point network:

- we had a preliminary agreement with Banca IBT that provides services through tobacconist shops: the idea is to enable these shops to recharge season tickets.
- we are contacting big chains of supermarkets in order to extend the possibility to recharge the ticket directly at the cash desks.

D Process Evaluation Findings

D1 Deviations from the Original Plan

No sensible deviations from the original plan

D2 Barriers and Drivers

D2.1 Barriers

Preparation phase

- **1. Cooperation with banks** – Banks are a "closed world" so it's difficult to cooperate and share solutions with them

Implementation phase

- **2. Limited testing** – Testing activities on a ATM are real, with real payments, so it was not possible to do many trials.

Operation phase

- **3. Customers needs** – If the printer is out of service it disconcerts users because they have no written proof of the result of the transaction

D2.2 Drivers

Preparation phase

- **1. Consolidated technology** – Bank standards and protocols are strong and reliable so they were adopted to interface TPER data base with bank systems without examining other market solutions.
- **2. External support** – An architectural simplification was adopted: TPER is interfaced with a company specialized in bank services that works as a the unique reference point. The bank service company manages the connection with the different banks so TPER does not have to do anything when a new bank wants to add this service to its ATM circuit.

Implementation phase

- **3. Similar applications** – A similar functionality for recharging already existed on the ATM system and concerned mobile phone recharging. This service facilitated the development of the new software for public transport season ticket recharge.

Operation phase

- **4.Familiarity with ATMs** - Citizens are already used to bank ATM because they already withdraw money and recharge their mobile phones with the self service machine. This familiarity facilitates the use of the new functionality for season ticket recharge.

D2.3 Activities

Preparation phase

- **Accurate planning** – The realization of the executive plan was a fundamental step: it contains the details on protocols, user interfaces, data store procedures, flows for the accounting system. The executive plan allowed to simplify and speed the implementation phase (activity to manage barrier 1)

Implementation phase

- **User friendly interface** The realization of the human interface progressed step by step together with the testing activities. This process facilitated a simple and user friendly solution. (activity to take advantage of driver 3)

Operation phase

- **Information campaign** - awareness campaign to inform annual season ticket holders and citizens in general on the new recharging system opportunities. (activity to take advantage of driver 4)
- **Service update** - In case the printer of the ATM is not operative and cannot print the receipt of the recharge, the recharge functionality is not available. This was the choice in order to avoid objections from users. (activity to manage barrier 3)

D3 Participation

D3.1 Measure Partners

- **Measure partner 1 -** TPER spa (in quality of public transport companies) developed the new recharging system

D3.2 Stakeholders

- **Stakeholder 1** – Citizens in general and in particular season tickets holders
- **Stakeholder 2** – Municipality of Bologna
- **Stakeholder 3** – Regione Emilia Romagna
- **Stakeholder 4** – Province of Bologna

The Municipality, Regione Emilia Romagna and the Province are the owners of the transport company so they influenced the strategic choices of innovative projects.

D4 Recommendations

D4.1 Recommendations: Measure Replication

- **System replication –** The system is easy to replicate but a necessary condition is the presence of an electronic ticketing system.

D4.2 Recommendations: Process (Related to Barrier-, Driver- and Action Fields)

- **Agreements with banks –** A strong committmens from the Management of banks is necessary in order to work with success in the «closed » world of banks that is characterized by high security policies, private protocols, strict certification procedures.