customer satisfaction factors; Light Rail; city logistics;
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CUSTOMER SATISFACTION FACTORS FOR LIGHT RAIL: WHAT CAN WE LEARN FROM A SUCCESSFUL CASE?

Summary. The main goal of this paper is to analyze customer satisfaction factors for Light Rail, identify a successful case and compare the level of service of this case with another system so that improvements in terms of price, time of journey and connectivity can be elaborated and suggested. The Docklands Light Railway (London, UK) has been identified as a successful case, which service levels have been compared to 'Metro Sul do Tejo, MST' (Almada, Portugal). As a result, a set of solutions to improve MST are proposed.

CZYNNIKI KSZTAŁTUJĄCE SATYSFAKCJĘ PASAŻERA LEKKIEJ KOLEI: CZEGO MOŻEMY NAUCZYĆ SIĘ NA PRZYKŁADZIE UDANIE WPROWADZONYCH ROZWIĄZAŃ?

Streszczenie. Celem niniejszego artykułu jest analiza czynników kształtujących satysfakcję pasażera kolei lekkiej, ukazanie takich rozwiązań, które przyniosły polepszenie satysfakcji i porównanie poziomów usług tych przypadków z innymi systemami, tak by opracować możliwe udoskonalenia w cenach, czasach przejazdów i połączeniach. Tym samym rozwiązania wprowadzone na The Docklands Light Railway (Londyn, Wielka Brytania) zostały porównane z systemem 'Metro Sul do Tejo, MST' (Almada, Portugalia), a wnioski z tego porównania posłużyły jako możliwe propozycje dla polepszenia usług MST.

1. INTRODUCTION

This project discusses the effects of Light Rail on passengers in cities. Additionally, we aim to identify a number of factors which contribute to the success of Light Rail, by analyzing the case of Docklands Light Railway (DLR) and the customer satisfaction factors identified on surveys previously

organized. Next, we compare DLR with the case of "Metro Sul do Tejo", with the aim to understand the behavior of both cases and hence define and recommend measures and solutions to improve customer satisfaction subject to a set of requirements.

1.1. Motivation

The motivation for this paper derives from the observations that there are certain Light Rail systems which perform considerably better than others. Not specifically because of the geographic location but mostly because of their ability to meet customer/ passenger needs. We are aiming to identify the reason for such growth as many reasons abound. Increasing population, increased investments in infrastructure, friendly staffs are all but a few of possible reasons for increased growth. This paper focuses on customer satisfaction.

1.2. Expectations

At the end of this paper, we expect to have successfully identified the various factors which most have an influence on customer satisfaction in the railway industry and most importantly Light-rail systems after which we should have the knowledge to recommend a suitable course of action for resulting increased growth in a chosen metro system.

1.3. Methodology

The development of this project was based on research regarding the case of the Docklands Light Railway (DLR) success. By defining the factors contributing to customer satisfaction on DLR and those identified on surveys, we could determine which measures and solutions could be implemented in the case of the 'Metro Sul do Tejo' in order to improve its service.

2. CURRENT SITUATION

2.1. Light Rail

During the 1960s, the transport policy of the European countries was oriented to automobile developments [1]. However, due to environmental and financial issues, the concept of sustainable mobility became a trend and led to new policies for mobility in cities. Due to increasing travel demands, struggle for space and livability in the cities, growing CO2 emissions from the transport sector and the need to enhance mobility, new transportation systems were developed [2].

In the 1980s, a new type of transport system was implemented in Nimes, France, called Light Rail System [3], which could be considered a hybrid system between bus and train, contributing for the flexibility of transportations within the city. This new system could introduce a lighter vehicle design than metro and also a lighter infrastructure [4], which could mean a lower cost, lower maintenance and higher revenues, allowing the system to be implemented in the city centers.

2.2. Light Rail and City Logistics

City logistics is the study of the dynamic management and operations of urban freight transport and distribution systems [10]. So, it includes the provision of services which contributes to efficiently managing movements of goods in cities whilst also providing innovative responses to customer demands [10]. These definitions point to the ever increasing need for better services both in passenger and freight transportation. Increasing customer demands puts strains on business inventories and the need arises for businesses to move their goods as soon as possible. The question becomes, "How do you move goods efficiently, whilst maintaining or even increasing the quality of services rendered to passengers", and even more so, meeting these demands through minimal expenditure of energy. In

order to restructure the urban environment due to the problems created by increase in automobile transport and struggle for space in the cities [1], Light rail has brought new advantages to city mobility.

The decision-making process and choice between transportation systems is not only in technology but also in the type of services, its image, and impact [1]. Therefore, decision-making processes for Light Rail involve great technical and social complexity [5], making each project unique but at the same time similar in regards to the policies, frame, and objectives around these projects [1]. For instance, the decision between implementing a Light Rail system or a Bus Rapid Transit system must be taken according to the advantages each system can bring to city mobility.

The Light Rail solution, besides being financially beneficial comparing to many other systems [1], also reduces commuting cost especially when living farther from the city center [6]. Additionally, it reduces traffic congestion [7] and restructures mobility around cities [8], generating urban development [1] in city centers and in suburbs [6]. Finally, Light Rail is a good solution for reducing vehicle dependence and emissions [6].

3. CUSTOMER SATISFACTION FACTORS

The purpose of this analysis is to explain the most important aspects that influence customer satisfaction when using a mode of transport. Therefore, we will define some customer satisfaction factors:

- *Reliability*: Reliability is the ability to be relied on. So it's a very important factor when choosing the mode of transport used. The higher the reliability of a system, the more it sells, which can be applied to light rail systems;
- *Price*: The price is based on the value customers perceive to get from the product and what they are willing to pay for it. So, an appropriate ticket price, in connection with the service offered, can encourage the use of light rail;
- *Journey time*: It is the time required for the vehicle to move from the origin to destination. Journey time savings can lead to reductions in vehicle operating costs;
- *Transport Connections*: A passenger chooses the mode of transportation that can offer more connections between road-rail, rail-maritime, rail-waterway and rail-air;
- *Cleanliness of trains and stations*: The cleanliness of stations and trains are aspects that are considered necessary and mandatory for passengers. It is usual to have a periodic cleaning of the areas open to the public;
- *Accessibility*: We can improve the accessibility through different actions: the construction of new infrastructure that makes possible new connections; planning of transport services;
- *Costumer-focus staff*: Customers value collaboration between staff and support service;
- *Ticketing service*: Possibility of accessing all the necessary information concerning the passenger's journey; ticketing information;
- *Information provision*: Communications equipment; information on the position and status of trains;
- *Safety and security*: Direct digital communication across the whole rail network with a host of additional safety features; security at the station and during the trip: small ordinary maintenance; activities of control and assistant passengers; occasional interventions; specific interventions.

3.1. Rail traffic growth and customer satisfaction

In the last years, we have seen a continued increase in Light rail usage in England, with both passenger journeys and vehicle miles reaching the highest levels recorded in the modern area, according to statistics from the Department for Transport, 2013/2014.

In 2014, on the eight UK transportation systems, 222 million passenger journeys were made in total, 18 million (9%) more than during the 2013. Nearly 60% of passenger journeys were on the two London systems [9].

In the last 20 years, we have seen significant increase of light rail services in the UK (Fig. 1) [9].

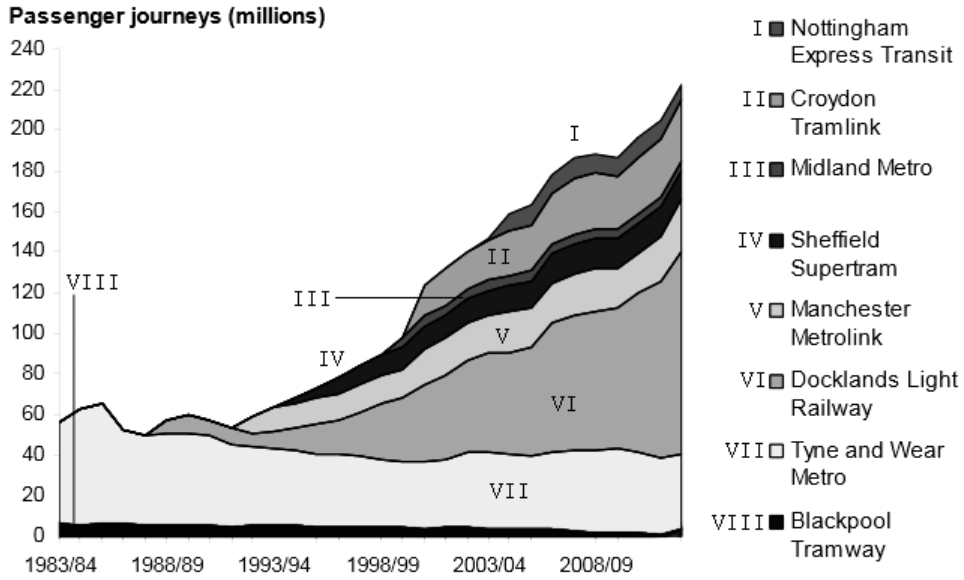

Fig. 1. Passenger journeys Light Rail in London
Rys. 1. Liczba pasażerów podróżujących koleją lekką w Londynie

It is seen that ever since its inception, the Dockland light railway has seen sustained growth over the past decade. This can mainly be attributed to its strategic location in London, where London has seen a remarkable growth in population. It is estimated that the London population will grow to 9 million by 2021 and 10 million a decade later [10]. However, population growth is not the only reason for increased usage of docklands rail service. Another major reason is because of its high reliability and more importantly, its ability to meet customer needs. A critical observation on how the Docklands services is run shows a distinct difference with the way other light rail services are run and as a result it becomes no longer surprising that light rail growth in the UK is solely attributed to growth of docklands light rail.

In a survey conducted on train passengers, where the aim was to determine the sort of factors which most influence customer satisfaction in railway (Fig. 2) [11], passengers where asked for their views of the specific journey they are making at the point they are surveyed and some interesting results were determined.

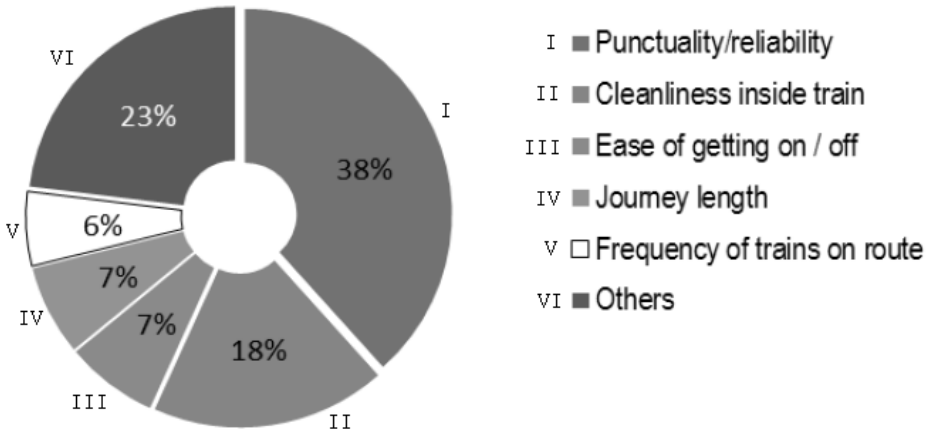

Fig. 2. Factors which most influence customer satisfaction
Rys. 2. Czynniki o najwyższym wpływie na zadowolenie pasażerów

Observations indicate that the factors which most influence customer satisfaction are Punctuality and Reliability. Customers tend to be more satisfied when the train service arrives right on schedule. Although it is not the only influence, it is the most influential owing to the fact that it is the first phase of the journey. Passengers who have planned their journey and expected arrival times will get really unhappy when there are any delays. When passengers know that at a specified scheduled time the train service is almost 100% certain to arrive reliability grows. Reliability grows when customer confidence grows. The next most influential is the general cleanliness of the train. When a passenger gets on the train, looking for a seat, litters and junks left behind by other customers' raises dissatisfaction. Nobody wants to be in a dirty environment. Other relatively influential factors include ease of getting on and off, journey length and frequency of trains on route. Passengers want it to be as easy as possible to get on a train. Passengers would be happy to get on and off the train even if the train was in motion as long as it was safe and possible. Rail service providers have to compromise between passenger safety, having to make it easy and swift for passenger to board or dismount from the train. It is a little surprising to see that journey length is not a major factor. There has always been a general perception that passengers want to get to wherever they are heading as fast as possible. Getting there in the shortest possible time would be considered a huge achievement. However from the data above, it is obvious that if the vehicle arrives on time and is generally clean, the speed of the journey doesn't matter that much just as long as the journey doesn't take too long. Frequency of the trains on the route refers to how often train service occurs in a specific station. It is known that when an individual, due to personal reasons miss a train, the first thing which comes to mind is "when will the next train be??". If an individual has to wait say 10 minutes, customers will be better satisfied than when they would have to wait over 20-30 minutes for the next train.

According to (Fig. 3) [11], it would seem that passengers are most dissatisfied with the way train services deal with delays. This could stem from the fact that customers understand that delays in certain cases are inevitable however customers loath being kept in the dark. A simple sincere explanation goes a long way to alleviating the concerns held by passengers. A passenger would be willing to wait out a delayed service when he/she understands the reason for said delays. When there are no given reasons, speculations occur and customers become more anxious. This leads to overall dissatisfaction with the service.

Journey length comes as the 3rd most influential factor for customer satisfaction. Essentially when the journey takes too long, stress sets in and customers become dissatisfied with services. The next most important factor is passengers would definitely prefer to be sated during their journey. It is more relaxing. Other important factors include price which doesn't seem to have a major effect.

When we apply these results to most light rail services, it is easy to see the benefits which can possibly be gained when railway services focus on customer satisfaction. More people will be inclined to take a reliable, clean and comfortable rail service especially when it is cheap. Companies should focus on increasing customer satisfaction without an increase in price. This would lead to increased usage of their services and ultimately increased revenues.

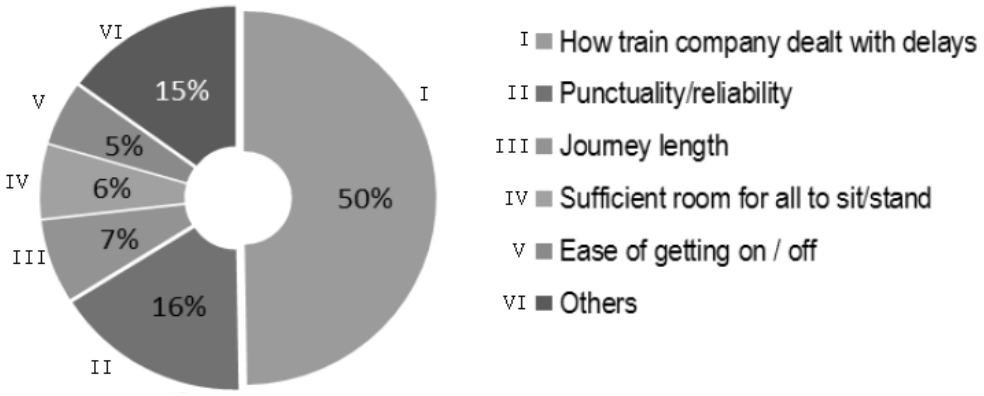

Fig. 3. Factors which most influence customer dissatisfaction
Rys. 3. Czynniki z najwyższym wpływem na niezadowolenie

4. DOCKLANDS LIGHT RAILWAY (DLR)

Docklands Light Railway system is located in Eastern London (Fig. 4) and is operated by Serco Docklands. It is composed by 7 lines (Fig. 5) [12], many high level stations and conventional steel wheel on rail.

Fig. 4. Localization of The Docklands Light Railway
Rys. 4. Lokalizacja The Docklands Light Railway

The DLR is controlled by an automatic system, managed from the central control room using a "moving block" system, which allows for closer headways than a conventional fixed block system. Therefore, "DLR remains the UK's only driverless automatically operated passenger railway" [12]. Table 1 presents a summary of the main characteristics of DLR.

Table 1

Main characteristics of DLR system

Docklands Light Rail Characteristics	
Length	34 km
Number of Stations	45
Major Urban destinations	Central London; Stratford; Beckton; Woolwich Arsenal
Passenger estimate	101.5 million
Frequency	83% (2013)
Operating speed	80-100 km/h
Modal split for public transport	41%

The Docklands Light Railway System is an example of how well a light rail system can perform in order to meet the customers' requirements and their satisfaction.

In the 1970s, the Port of London's freight-handling facilities moved to the deep-water container port at Tilbury. The centuries-old London Docks were quickly abandoned, with the loss of thousands of jobs [13]. Therefore, the idea of developing a new transport system in the Docklands area, in the East part of London, appeared when LDDC (London Docklands Development Corporation) started to set plans for an Underground extension to East London in the 1960s and 1970s. Later on, LDDC, LRT (Light rail transit) and GLC (Greater London Council) set up a working party to consider ways of improving public transport. Each organization presented different views on routing, extent of street running and choice of technology. LDDC preferred a highly visible, automated and driverless system. LRT favored a functional, simple system with tram type vehicles and a minimum of new technologies and GLC wanted a local railway, serving residential communities [9].

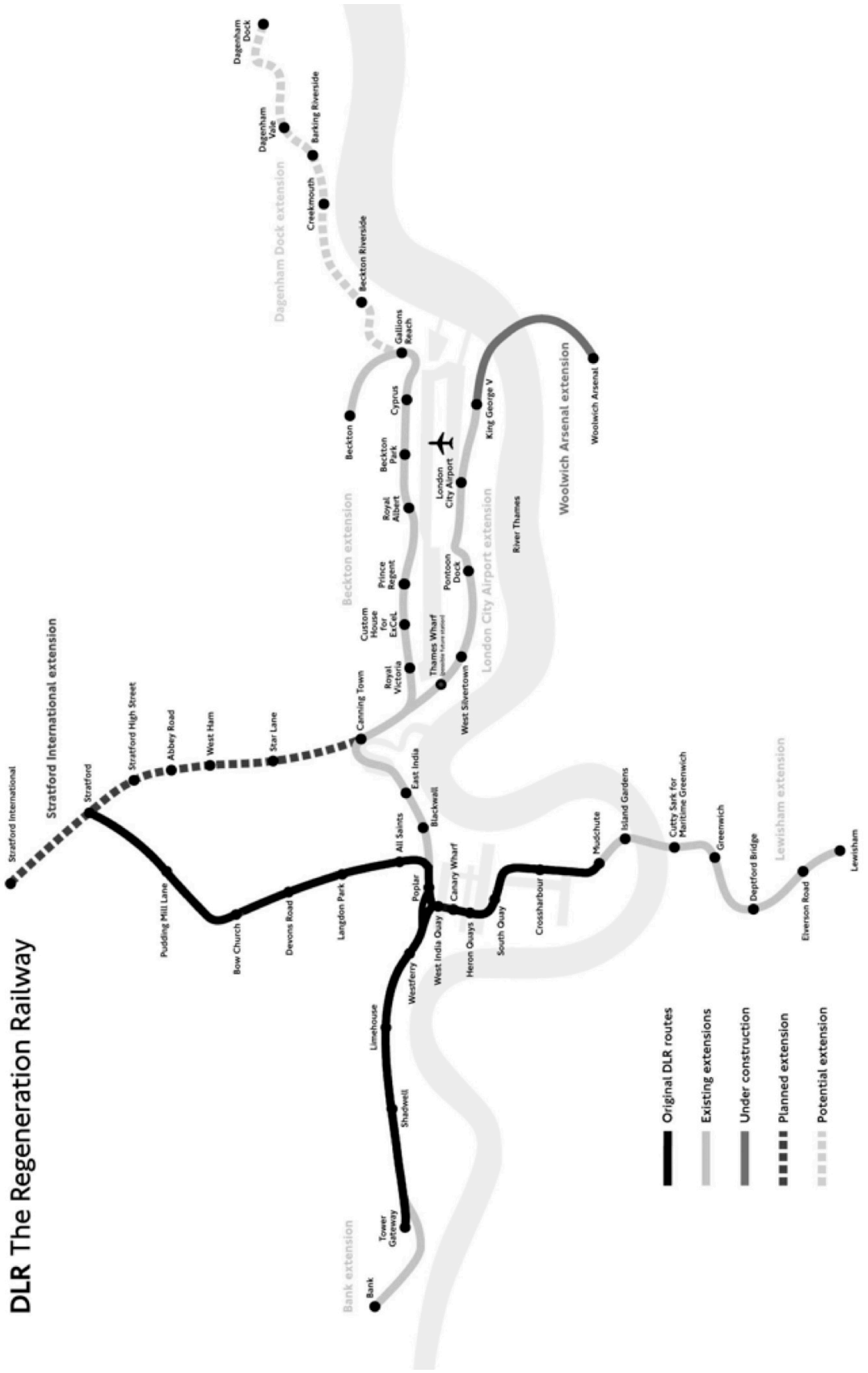

Fig. 5. DLR System
Rys. 5. System DLR

Several studies were conducted in order to define the best solution by examining express bus routes but also by building a case around the effects the rail would have on the area and in order to know the likely development of Docklands with and without the railway [9]. In order to meet these requirements, they decided that Light Rail would be the best solution to implement. The conclusion was that light rail could stimulate development by increasing employment and value of industries rather than warehousing and distribution, and that the two alternative routes could have different functions. The east-west route would provide the link between Docklands and the City, bringing benefits for the residents and establishing a link which could improve city related businesses in Docklands. The north-south route would provide a link from the residential areas of north east London into the areas of the Isle of Dogs [9].

The Docklands Light Railway (DLR) opened in 1987, starting with three lines linking Stratford (north), Island Gardens (south) and Tower Gateway (west), with the intersection being at Poplar, becoming central to the regeneration of east London [12].

In 1991, operating difficulties and low performance indicators led to the change of ownership from London Transport to LDDC, in order to solve some railway's problems identified, starting by implementing new signaling systems across the network, improving management practices and solving software problems. Additionally, improvements in service reliability led to a much better performance of the system in 1994.

In 1997, DLR was franchised to the private sector for the operations and management of the line. The reason for franchising the railway at this point was to secure savings in the cost of running the railway whilst at the same time raising quality and performance standards [9].

The development of new projects and new Light Rail lines led to residential renewal in Docklands and to the creation of the Docklands business and finance district. In 2005, the extension of the line to the London City Airport increased the number of passengers using it, along four main stations: West Silvertown, Pontoon Dock, London City Airport and King George V, serving a population of about 8000 people [14]. Additionally, the access to the London City Airport by rail increased (Fig. 6) [14], and 90% of passengers reported that the extension has made their journey easier and quicker, and 50% reported it was cheaper than using a private car [14].

In 2010, an enhancement project for DLR took place and 3-car length trains started to operate, improving capacity, reducing crowding and the overall time to complete a journey on the DLR [15].

The extension of the line south of the river to Woolwich Arsenal brought improvements (Fig. 7) [20] in time distances and comfort for passengers, replacing the usage of the ferry. Also, the improvements of the line for the 2012 Olympic Games contributed for the success of DLR [12].

According to the latest forecasts, it is expected that the number of annual journeys of passengers in the Dockland Light Rail will increase (Fig. 8) [17].

It is possible to observe that the increase in passenger journeys in DLR in 2012 was due to redevelopment after the Olympic Games, where significant improvements were made and there was a lot of focus on customer satisfaction [16]. Although it is expected that the demand in DLR will continue to rise due to population growth, we can see a decrease in the number of passenger journeys in 2018. That's because it is expected to open the Crossrail, which will provide a new route between central London, Canary Wharf, Custom House and Abbey Wood [16]. Crossrail will provide new capacity and allow Docklands and DLR to support further growth, particularly in the Royal Docks [16].

The success of the DLR was due to a variety of external factors that contributed to his development but also because of the operations and management systems continuous improvements along the years. Besides the passenger numbers growth to an average of 90 million a year, a very good indicator of this success is the high level of overall customer satisfaction of 88 out of 100 [16]. In this case, 96% of trains were on time, 96% of journeys were made within the target times, the availability of station services (ticket machines, escalators and information displays) was 98% and lifts availability was about 97% [16]. In fact, it was clear that customer satisfaction was related to the perceived reliability of the system to passengers. Identified by customer surveys are some factors that influence customer satisfaction (Table 2): Reliability, punctuality, price, journey time, transport connections, cleanliness

of stations and trains, accessibility, customer-focused staff, ticket service, information provision, safety and security and overall satisfaction [16].

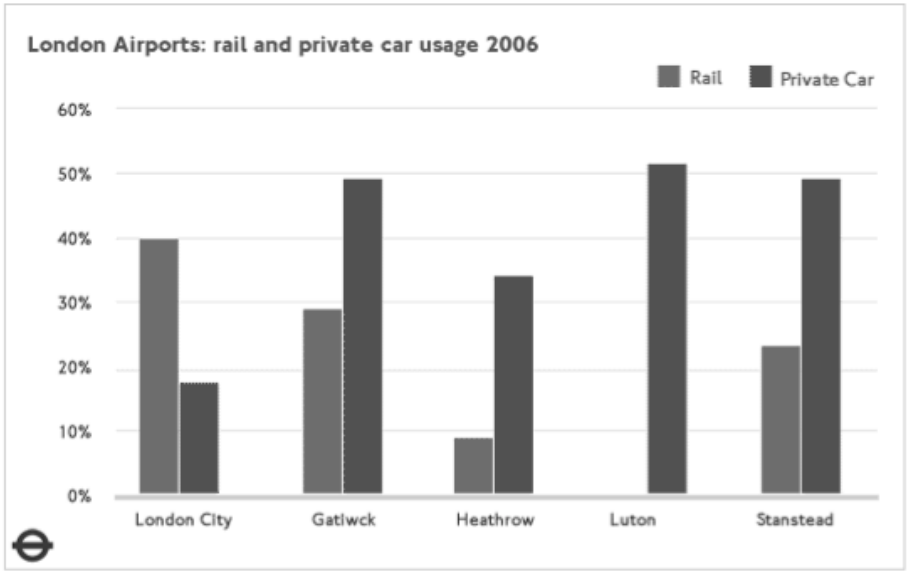

Fig. 6. London Airports: rail and private car usage 2006
Rys. 6. Dojazd do lotnisk w Londynie: użycie kolei oraz samochodów w 2006 roku

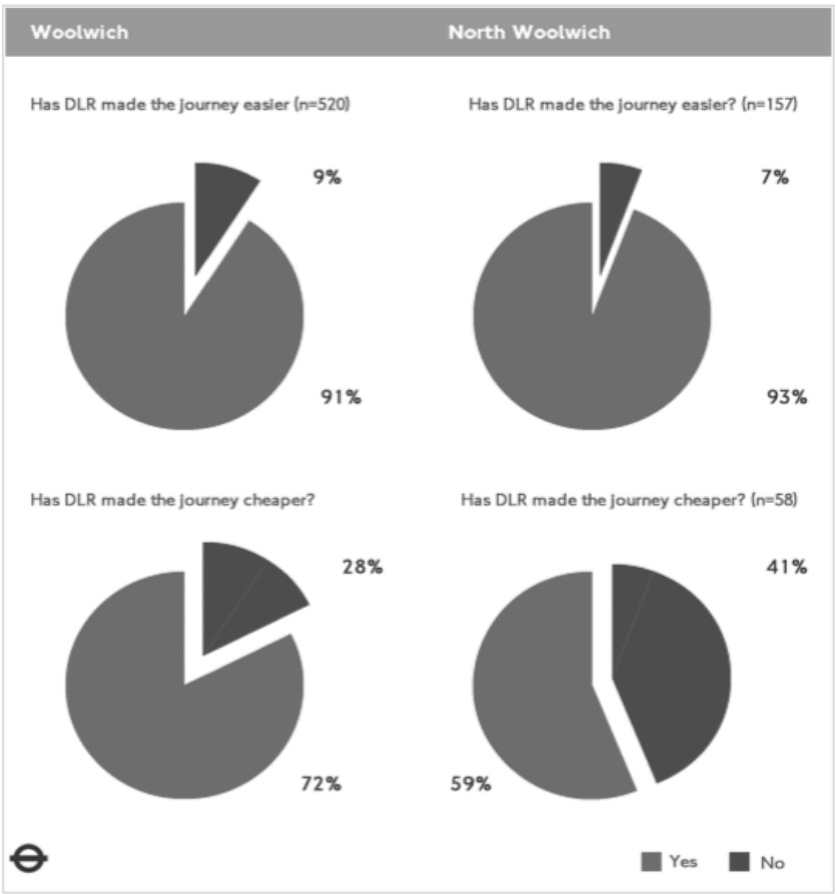

Fig. 7. Results of the survey on improvements in Woolwich and North Woolwhich
Rys. 7. Wyniki badań o udoskonaleniach wprowadzonych w Woolwich i północnym Woolwhich

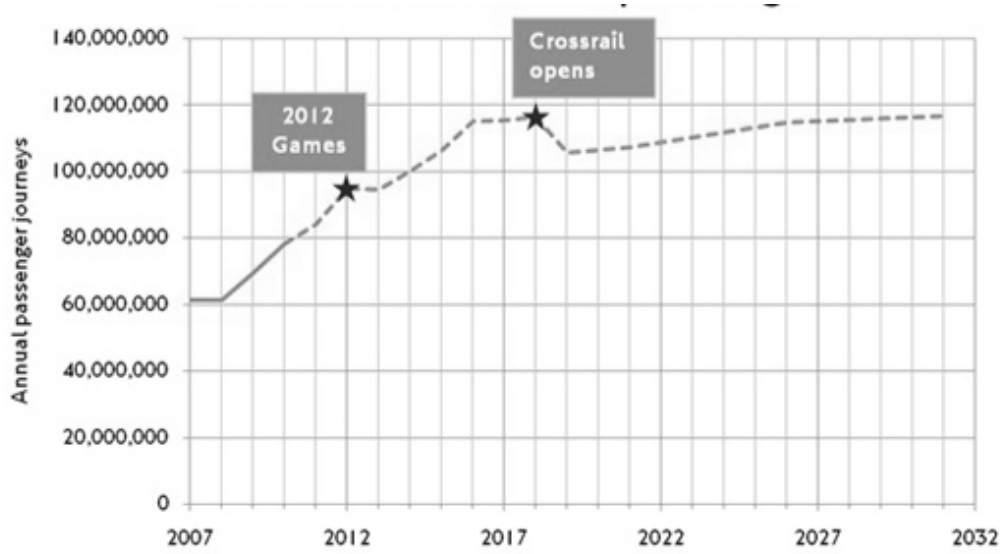

Fig. 8. DLR current & forecast patronage
Rys. 8. Obecna liczba przejazdów DLR i prognozy

Table 2

Factors influencing passenger satisfaction on DLR

Factors influencing passenger satisfaction	Docklands Light Railway (DLR)
Reliability	At least the 82% of consumers is satisfied with DLR reliability.
Punctuality	96% of trains were on time.
Price	At least 65% of the passengers considered the optimal cost of the ticket
Journey Time	At least 96% of all journey times fall within target times [16].
Transport connections	London Rail, Tube and bus, promoting interchanges with other local transport services [16], offering a Single ticket for intermodal transport. The most important interchange on the system is Poplar station, as all DLR routes run through here (h2g2.com, 2013).
Cleanliness of trains and stations	Stations are swept and handrails and other surfaces are cleaned every day; Newspapers and rubbish are cleared from trains; Recycling; Deep cleaning [16].
Accessibility	Every station has access to platforms via lifts or ramps; Wheelchair bays and designated seats in the carriages; For visually impaired passengers, platform edges and steps have a tactile surface [16].
Customer-focused Staff	A member of staff is on board every DLR train and on stations for passenger assistance; Staff recruited locally to ensure that they have the knowledge to deal with a range of possible questions and incidents [16].
Ticketing service	Easy use of ticket machines; Ticket machines have Chip and PIN for secure transactions; Multi-language facility; Tickets can be bought at Information Points at Canary Wharf and London City Airport or from local Ticket Stops [16].
Information provision	Passenger information displays are always available and accurate (Control Centre and Passenger Service Agents); An audio-visual system on the trains announces the train's destination, the next station and interchange information; Train departure information and the status of DLR, Tube and London Overground services ; Timetables, notification of service changes; Information on leaflets and on the website [16].
Safety and security	Closed-circuit television (CCTV) cameras and passenger alarms [16].

5. METRO SUL DO TEJO

The need to increase mobility of passengers in Almada municipality and the emergence of transport sustainability led to the development of a light railway system in the region [18]. The main idea was to integrate road transport, waterway transport, rail and soft modes in the city. Therefore, the *Metro Sul do Tejo*, a light rail system, was implemented in Almada municipality, south of Lisbon, in Portugal.

This system interconnects the communities of Almada and Seixal, offering connections to the main railway line and ferries serving Lisbon. The system is constituted of 3 track lines (Line 1: Cacilhas – Corroios, around 7,2 km; Line 2: Corroios – Pragal, around 5,9 km; Line 3: Cacilhas – University, around 6,7 km), ensuring connections between different modes of transport (Fig. 9) [18]. This light rail has the capacity to transport 300 persons and operates at a maximum speed of 70 km/h.

Fig. 9. Metro Sul do Tejo network in Almada Municipality
Rys. 9. Sieć Metro Sul do Tejo w Almada

This network is very important for municipality because it operates in a densely populated area, and connects to main interfaces, rail (Pragal) and waterway (Cacilhas) [18].

However, the usage of the line by passengers has been lower than anticipated. From 2008 to 2010, the volume of traffic was 30% below predictions [5]. Although offering a capacity of 260000 passengers/day and 6000 on peak time, this service has not been able to fully occupy its place in the chain of transportation and fulfill its potential capacity [18]. However, there has been a slight decrease of passengers transported by bus and boat and an increase for suburban train and light rail usage until 2011 (Fig. 10) [18].

As it can be observed, in 2012 the usage of metro suffered a decrease (along with the other transport modes) and rising of tariffs due to European crisis and unemployment [18]. However, besides external factors, it was verified that factors associated to customer satisfaction requirements weren't being met. For this reason, customer satisfaction surveys were conducted in order to understand clients' requirements. The results presented a high level of satisfaction of customers regarding the service provided. The positive aspects identified were commodity of vehicles and transport, social, economic and environmental impact of light rail, and staff presentation [5]. In fact, the introduction of light rail system improved the connection between light rail and bus and reduced

car traffic [19]. Additionally, customers identified aspects worth improving: information access about traffic, reduction of journeys time and waiting time, connectivity with different modes of transport and accessibility [5].

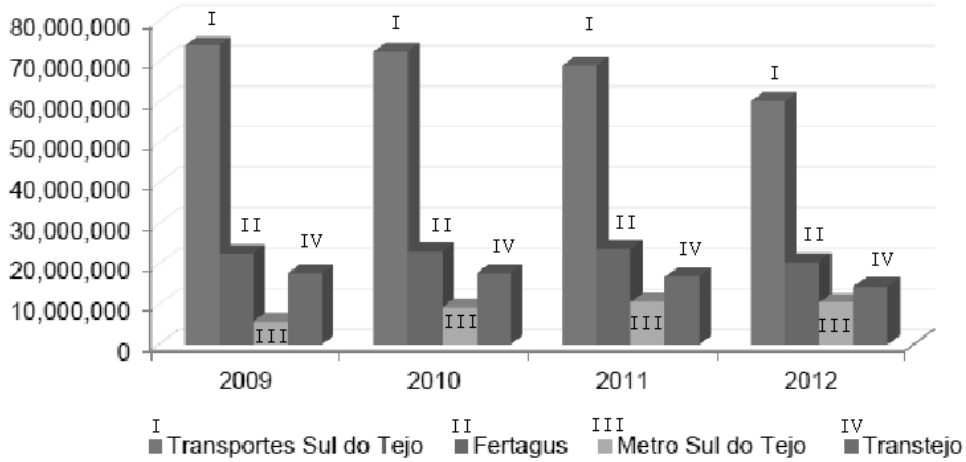

Fig. 10. Passengers distributed per mode
Rys. 10. Liczba pasażerów podzielona ze względu na wykorzystywany środek transportu

The main problems identified in this system were the non-integration of modes of transport (timetables and prices) and competition between modes of transport, without regulation. The excess of bus transport with origin/destination between Cacilhas/ Corroios and Cacilhas/ Pragal/ Universidade (Fig. 11) [19] increased direct competition with light rail.

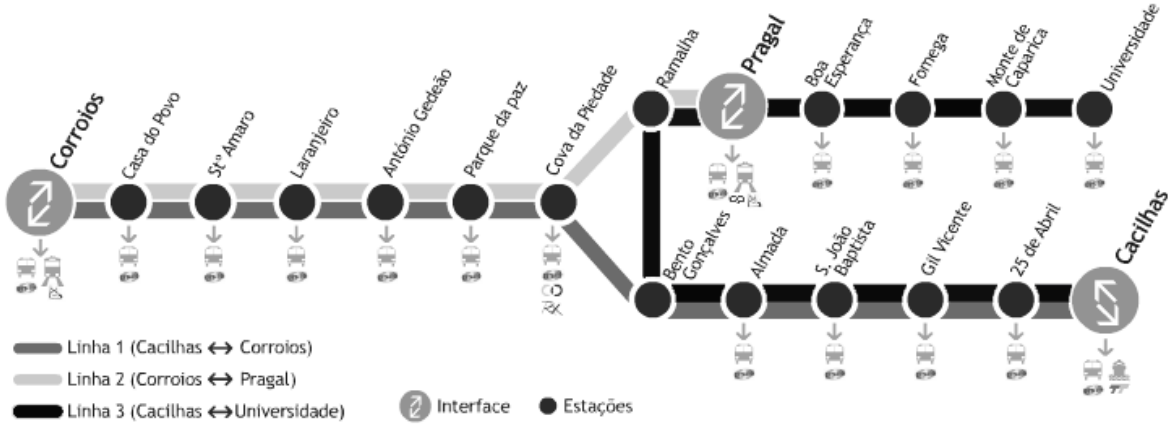

Fig. 11. Light Rail Network in Almada Municipality
Rys. 11. Sieć lekkiej kolei w mieście Almada

When analyzing the competition problem between different modes, we compared the prices and times of journey for the same route (Table 3)[21,22], and identified that light rail is cheaper and faster than bus, if traveling along the three main lines of *Metro de Almada* (Urban Area). Therefore, the usage of light rail should be much higher than currently is.

However, when the destination of passengers is not between the main three lines (suburban and regional area), there is a difference of price, time of journey or even commodity, that can influence customers to use bus rather than light rail or train. Comparing, for instance, the route between Cacilhas and Setúbal (Table 4) [21, 22], it is quite obvious that the cheapest way of travel is by Light Rail + Train. However, the difference of cost between this solution and the use of Bus is only 0,15€. Therefore, because there is no integration between the timetables of light rail and the other modes of transport, the time spent waiting for the next mode leads to an increase in the total time of journeys.

So, in order to ensure that the travel time is the smallest, passengers prefer to use only Bus, even though it's the most expensive mode of transport available.

Table 3

Comparison of price and time of journey for light rail and bus, in different routes

Corroios - Cacilhas		
Mode of transport	Price	Time of journey
Light Rail	0,85 €	19 min
Bus	1,35 €	27 min (Suburban bus)
Corroios - Pragal		
Mode of transport	Price	Time of journey
Light Rail	0,85 €	15 min
Bus	1,35 €	20 min
Cacilhas - Universidade		
Mode of transport	Price	Time of journey
Light Rail	0,85 €	19 min
Bus	1,35 €	27 min

This example shows that more than only the price and time of journey, passengers prefer to use a direct transport rather than changing to another transport.

Table 4

Comparison of price and time of journey for different combinations of transport modes

Cacilhas - Corroios - Setúbal		
Mode of transport	Price	Time of journey (without waiting times)
Light Rail + Bus	4,85 €	1h21 min
Bus	4,00 €	1h14 min
Light Rail + Train	3,85 €	1h03 min

6. RECOMMENDED SOLUTIONS

In order to improve the Light Rail system of Almada, the main measure should be ending with the overlap of light rail and bus routes, because the main problem identified was the existence of many bus routes along the Metro line. An effort should be done in order to integrate the modes of transport, by synchronizing timetables between light rail, buses and trains. Additionally, defining a single ticket for both light rail and bus, or light rail and train, could reduce the costs for passengers and could attract customers to different modes of transport, promoting the intermodality of passengers.

The time of journey was identified has one of the most influential factors for a passenger when choosing a mode of transport. Therefore, improving the connections between modes (infrastructure) could reduce the time of journey for passengers.

The regulation of competition between modes of transport could bring benefits not only for passengers but also for the transport operators. This could increase the number of passengers, improve the focus on customer needs and finally improve the overall satisfaction of customers.

The combination of modes of transport could be a very good solution in order to reduce times of journey. However, in the city center, transport by bus depends on traffic, which can increase time of

journey. Therefore, the implementation of smaller and flexible buses in the city canter could improve customer satisfaction an attract passengers.

Finally, providing more information to customers could increase passenger awareness, satisfaction and consequently, a much higher use of the light rail "Metro Sul do Tejo".

7. CONCLUSIONS

The wide implementation of Light Rail in cities can bring a variety of benefits for customers and operators. Firstly, light rail increases revenues by lowering commuting costs, maintenance costs and, therefore, the overall costs. Light rail also brings environmental benefits because it reduces the air pollution due to a reduced use of cars and buses. Additionally, mobility in cities improves due to reduction in traffic congestion based on flexibility offered by light rail. It also generates urban development, beret living conditions and therefore, population growth. Finally, the use of light rail connects the peripheries to the city center and offers better access to facilities.

The most important customer satisfaction factors that influence the use of light rail for a passenger are the reliability of the system, the punctuality of the transport, the price of it and the time of journey needed to go from one point to another. Additionally, transport connections between different modes of transport and accessibilities in the stations can be decisive factors for the choice of a mode by a passenger. Information provision, a simple ticketing service and a helpful staff, can attract more passengers to the system. Finally, cleanliness of the train and stations and issues related with safety and security are important satisfaction factors for passengers.

Besides requirements related to passenger preferences, the successful implementation of a light rail system can also be explained external factors securing a good performance of the light rail system; factors such as the network deployment, population growth, connectivity with different modes of transport and competition between operators. However, meeting customer needs is the main factor for a successful and functional system.

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