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International best practices in managing unplanned disruption to suburban rail services

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Abstract

This paper analyses the management approaches of passenger railways towards unplanned disruption of service, and provides examples of best practices from suburban railways around the world.

The priority of participating railways is to return service to normal as quickly as possible and provide at least some services on core routes. The greatest challenges include the provision of accurate and consistent information, arranging alternative transport and the need to make fast decisions.

The paper highlights a number of best practices, such as the use of ‘Central Crisis Rooms’ as the focal point for all disruption management, including decision making, CCTV coverage of affected areas and liaison with alternative transport providers.

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1. Introduction

This paper analyses the management approaches of passenger railways towards unplanned disruption of service, and provides examples of best practices from suburban railways around the world. The paper draws on findings from the International Suburban Rail Benchmarking Group (ISBeRG), a group consisting of 15 suburban railways which identify and share best practices regarding a wide range of railway issues in a confidential environment.

The findings of this paper are based on questionnaire responses provided by suburban railways as part of an international benchmarking process, and a workshop involving over twenty subject matter experts from railway operators. The workshop and survey responses demonstrated that there is great variation between railways in terms of their approaches to disruption management, and the procedures that are undertaken. Kohl et al (2004) noted that the response to disruption is important in ensuring that passenger impact is minimised. It is often one of the aspects of rail

services with which passengers are least satisfied, as revealed in customer satisfaction surveys (Passenger Focus, 2011 and NSB, 2015).

This paper aims to highlight the best practices in each of the following areas, based on the experiences of suburban rail operators:

- Planning for Disruptions
- Staff Roles and Training
- Customer Information
- Alternative Transport
- Performance Metrics

Participating railways were asked about their most significant priorities and challenges during unplanned disruption, and what changes have been implemented to try and address these.

The disruption based performance metrics used by each railway, such as a passenger affected ratio in one railway, and the grading of each incident in another, were also analysed. These metrics are used to improve the response and management for future incidents, for example through staff training or disruption debrief meetings.

The questionnaire responses from railways identified that there are two main approaches to providing customer information; those that provide information as soon as it becomes available, and those who wait until they are sure an accurate diagnosis can be made.

The paper is organised as follows. Section 2 summarises the existing research surrounding the management of unplanned disruptions to rail services, and section 3 outlines the methodology. Section 4 discusses the best practices with regards to managing disruption in five separate areas. Finally, section 5 concludes the paper with a summary of the current best practices used internationally by suburban rail operators.

2. Research Context

The management of unplanned rail disruption is an area which has received a significant volume of research over the last decade. However, much of this has tended to focus on the creation of models which can be used to aid the rescheduling of services and crew. There is comparatively little research regarding international best practices based on the experiences of operators and infrastructure managers across the five areas identified in this paper. The most comprehensive study is that undertaken by Pender et al. (2013) detailing the passenger needs during an unplanned disruption through an international survey of 80 rail organizations.

Disruption management is defined by Jespersen-Groth et al. (2009) as the ‘the joint approach of the involved organisations to deal with the impact of disruptions in order to ensure the best possible service for the passengers’. In the discussion by Kohl et al (2004) the three main objectives of disruption management are outlined, albeit in relation to airline disruption. Kohl et al (2004) state that the first objective is to deliver the customer expectations, the second to reduce costs and thirdly to revert to the original schedule as soon as possible. These objectives also apply to the railway industry, although it is felt that a fourth objective of keeping passengers informed should be added.

Jespersen-Groth et al. (2009) discuss the roles of different actors in the disruption management process. This is particularly important in suburban rail, where it is common for the operator and infrastructure manager to be separate organisations.

The proliferation of handheld devices and social media in recent years has meant that a range of approaches to social media have been developed. In addition, customers also use social media to discuss disruptions. In an unplanned rail disruption context this is important to note, as it means that customers can acquire information from social media before a railway has made any official announcements, often leading to inaccurate information being spread. The variety of social media approaches in the UK led to the Association of Train Operating Companies (2014) issuing an approved code of practice on passenger information during disruptions in 2009, and most recently updated in 2014. Pender et al (2014) undertook a detail literature review of social media use during unplanned transit network disruptions. It is important that railways use social media in addition to existing information channels, and not as a replacement for these channels. In a study of London Underground, Harazeen (2011) found that accurate real-time

information was a high priority for customers. This demonstrates the importance of social media, and therefore the need to ensure that information is correct and concise.

3. Methodology

The research is based on a survey of 15 suburban railway operators from Europe, Asia, America, Africa and Australia that are part of the ISBeRG benchmarking group that is managed by the Railway and Transport Strategy Centre (RTSC) at Imperial College London. The members are operators from the following cities around the world: Barcelona, Brisbane, Cape Town, Copenhagen, Hong Kong, London, Melbourne, Munich, New York (two operators), Oslo, San Francisco, São Paulo, Sydney and Tokyo. The group aims to identify and share best practices in a confidential environment, and therefore study results can only be published in an anonymised form. As a result, participating railways will not be identified by name throughout the paper, except in cases where the information is already available in the public realm.

A questionnaire was sent out to all ISBeRG members in February 2014. The survey looked at railways' experience with disruption management. It included questions on contingency plans, procedures during disruption and what measures are used by railways to measure performance of disruption management. Responses were received from all 15 operators. Follow-up questions were sent to gather further in-depth information about responses, and a Disruption Management workshop was held in February 2015 with representatives from 8 suburban rail operators. The next section presents and discusses the results of the survey and workshop.

4. Discussion

Flier et al (2009) found that the key to managing unplanned disruption to suburban rail services is to be prepared and, as far as possible, plan for the unplanned. One method of doing this is to produce a series of contingency plans that can be implemented for a wide range of scenarios. For example, a contingency plan could be produced for each branch of a suburban rail network in case certain sections have to be closed due to an incident, such as a signal failure. The response from railways demonstrates that a contingency plan should set out a process for staff to follow, what and when to inform customers, what alternative transport should be provided and so on.

4.1. Planning for disruptions

A best practice in planning for disruptions is demonstrated by one suburban railway who have a network-wide alternative route strategy for unplanned disruption, including agreements with other transport modes and operators, which can be quickly implemented when required. In addition, three railways have also prepared contingency plans for the complete shutdown of the entire network. These have been implemented during extreme weather events, such as sustained snowfall or hurricanes. However, decisions need to be carefully considered to ensure that the impact on the customer is minimized, for example by making the decision several hours in advance of a shutdown based on weather forecasts, and informing customers that no service will be running after a certain time. This enables the customer to use the service whilst it is still running, or make alternative arrangements during the shutdown. Pender et al (2013) note that of 71 transit agencies surveyed for their research, 20% had parallel transit systems which could be used during disrupted service.

A decision to temporarily shut down the entire network as a result of an unplanned event can still be planned for in advance. One railway noted that many decisions are pre-planned, such as where to keep rolling stock during the closure, which may have to balance the prevention of damage to stock (for example, as a result of flooding, snowfall or hurricanes), and positioning for when the service re-commences. This information should all be available from a pre-prepared contingency plan and can therefore be implemented at short notice.

A proven successful method for co-ordinating such shutdowns, as well as the response to other unplanned disruptions, is to have Central Crisis Rooms, which can be used as a 'one stop shop', and therefore centralising all decisions to be made from one location, to ensure a holistic and unified response. For example, one member has

moved their Customer Control Centre in to the Train Control Centre, encouraging direct communication between the two. The Customer Control Centre includes CCTV coverage of all stations and sidings, as well as some rail replacement bus stops. This allows the impacts of a disruption to be monitored and responded to as required. A further role of the Customer Control Centre is to liaise with the relevant alternative transport service providers and manage the alternative transport based on the decisions being made by the Train Control Centre regarding the affected train service.

All participating railways stated that during unplanned disruption they would consider turning back trains before the end of a planned route, or not operating a section of the network, although the latter was generally as a last resort. Further, fourteen of the members responded that they simplify timetables during disruption or have previously run shuttle services on branches. All but two members change stopping patterns, whilst all but three simplify routes. Due to the network constraints, only eleven of the fifteen members reported overtaking on lines.

When preparing contingency plans, it is important to ensure that the following aspects are considered for each possible scenario:

- Changes to the normal schedules (such as timetable, crews, equipment)
- Changes to the stopping and service patterns
- Express/shuttle running of certain services
- Roles and responsibilities of front line staff
- Information for customers, via a range of channels including staff, at stations, internet and SMS
- Ticketing and fares systems
- Crowd management
- Maps of network / stations
- Typical patronage data by time / route
- Alternative transport information including routing, capacity, frequency and journey times

4.2. Staff Roles and Training

During unplanned disruption it is vital that staff are kept informed and are utilized effectively to manage the movement of customers.

One railway has created a new professional position, a ‘client informer’, whose focus is to keep customers up to date during unplanned disruption. This was implemented alongside a new co-coordinator position within the control centre to help with the flow of information between staff during disruption, when information can often be disjointed. The railway has deemed the introduction of these two positions to be a significant success.

All contributing railways, with the exception of two, have dedicated programmes to train staff in disruption management. Good practice is demonstrated by two members who undertake drills to re-create possible disruption scenarios, allowing the staff to simulate a response and receive feedback about how it can be improved. This is an effective method of training staff for managing a ‘real’ unplanned disruption. In addition, one railway operates disruption workshops alongside existing programmes such as desk top exercises and on-site training, which further enhances a staff member’s competence in responding to a disruption. These training sessions are most effective when all stakeholders are involved, such as the infrastructure manager, alternative transport providers and, where necessary, emergency services.

Railways believe that it is important staff are trained to manage the emotional side of the customer experience during an unplanned disruption. Several railways provide station staff with extensive training to deal with confrontational customers effectively and efficiently, allowing them to diffuse the situation and convey information in a calm manner.

Due to the proliferation of smartphones and social media, information about disruptions can be obtained very quickly by customers at stations and on trains. Often, the information on social media is not necessarily accurate, and therefore railways need to ensure that staff have at least the same level of information as the customer. One effective way that railways do this is through group messaging apps such as ‘Whatsapp’ or ‘GroupMe’, as large groups of staff can then be kept informed in real-time. For example, a messaging group could be set up for station managers or train guards, so that the information is distributed to these staff as soon as it is received by the control centre.

4.3. Customer Information

According to Pender et al (2014), during times of disruption, customers need accurate and up-to-date information to allow them to make a decision about how to proceed with their journey. The study of ISBeRG members found that there are two schools of thought in relation to when information should be given to customers. The first, and most popular of the two, is to provide information to the customer as soon as it becomes available. This strategy allows the customer to then make their own informed travel decisions or plans without a further delay. However, this can lead to some inaccurate information being shared, as operators are unable to fully verify the information and estimated delays may be incorrect.

The second school of thought is to not make any announcements during the initial phase of the disruption to ensure that an accurate diagnosis can be made to prevent false information being provided. For example, one member makes no announcement within the first five minutes, but it then becomes mandatory to make an announcement at five minutes.

The best practice is somewhere between the two schools of thought, with a balance required to ensure information is provided to customers quickly, but also that the information is accurate.

As referred to in the previous section, the emergence of smartphones and social media has made it much easier for customers to acquire information about the service, although there is a danger that this information is not always accurate. It is important that railways react to this by having their own official channels to disseminate accurate information to customers. Research by Outlook (2012), noted that customers have a preference for concise, real-time information, which demonstrates the increasing need of social media during disruptions.

One method of achieving this is by developing an app. For example, Metro Trains Melbourne have the 'MetroNotify' app which allows customers to set up personalised alerts for their most regular journeys, as well as check service status whenever required. Several members do not have official apps available to customers, but instead provide open data and allow third party developers to produce apps. This reduces costs for railways and generally allows the customer to have a wider range of apps, but it does mean that there is a danger that the app is inaccurate, or that the developer will stop updating it. In addition, customers do not tend to differentiate between official and third party apps, so the railway is often held accountable for poor design or inaccurate information, whoever has produced it.

The railway responses to the questionnaires stated that monitoring social media is an extremely useful method of gaining a real-time customer insight in to the operational response to a disruption. This tends to require at least one Full Time Equivalent who has the responsibility of responding to complaints and passing on any information to the necessary parts of the organization. For example, a customer may tweet that the railway has failed to provide any communication about the delay, and therefore the staff member can pass this on to the train crew or station staff and ask them to make an announcement. It can also be a useful tool to gauge how customers perceive the response to the disruption, such as the provision of buses as an alternative means of transport, and may lead to changes in future responses.

It is important that railways use a range of channels to inform customers during disruption to ensure that all demographic of customers are reached, as well as the breadth of customers at different points of their journey. For example, social media may be the best method to inform younger customers, but radio and TV announcements may be more effective at notifying older demographics. The different channels should utilize 'push' methods (such as personalized app, email and text alerts, TV/radio announcements) and 'pull' methods (such as railway website/journey planner). In general, the push methods are the best means of contacting customers who are not yet on the network, and this can help to reduce the impact of the disruption. However, there is also a need to reach those customers who may not have a smartphone or social media, so more traditional methods such as station and train announcements, are also required. These methods are generally more effective for reaching those customers already on the network.

Where a range of channels are used they need to be co-ordinated so that they all distribute consistent information at regular intervals. If alternative transport modes or alternative routes are recommended then these should also be communicated through all channels.

It is also recommended that, where possible, railways send customer ‘response teams’ to major stations or branches affected by disruptions. The railways which currently do this have staff specially trained to deal with confrontational passengers and are equipped with smartphones or tablets so that real-time information can be checked and passed on to customers.

As well as providing customers with information during disruptions it is also beneficial to offer ‘good-will’ gestures, such as providing water during hot weather or ponchos during wet weather. Small gestures such as these are cheap and easy to implement, but can help the customers feel that they are being considered and looked after during a disruption.

4.4. Alternative Transport

All participating railways currently use dedicated rail replacement bus services as a method of alternative transport during disruption, in addition to directing passengers to existing public transport services. Taxis are less commonly used as a mode of alternative transport, generally only being required for low patronage services or for the mobility impaired. Two members with high passenger volumes and predominantly serving densely populated areas stated that they do not use taxis at all as a form of alternative transport during disruption as buses are a lot more suitable for transporting the required passenger numbers. All members utilize private contractors for the rail replacement bus services, whilst four organisations also make use of in-house buses.

There was some variation between railways in how the number of required replacement buses was determined. Twelve of the railways that responded to the questionnaire stated they used historical passenger count data to estimate the number of passengers, and therefore how many buses were required, with one member using the historical data and deducting 20%, as this proportion arrange their own transport or do not continue to the planned destination. Two railways stated they had pre-planned arrangements with the bus suppliers and one determines the number of buses by the timetables, driver rosters and number of routes. Most railways follow the rail route as closely as possible with the rail replacement bus, but one reported skipping intermediate stations with lower demand, whilst another stated they regularly make additional stops, such as at other transport hubs which may not necessarily be on the railway line affected by the disruption.

Once the buses are deployed it is important to ensure that they are used efficiently. One member has set up dedicated radio frequencies for each of the bus companies they use, which allows them to communicate individually with each operator in real time, and to provide instructions and check on progress, location and estimated time of arrival, whilst another member uses GPS and CCTV to monitor the location of buses. One railway reported that replacement bus drivers are bound to a timetable, and bus marshals are also deployed at key stations to oversee replacement bus operations and to deploy standby buses to cover service gaps, unexpected patronage or to minimise customer inconvenience. A further response stated that the railway places a member of staff on buses, which helps to ensure the bus drivers take the correct route and that no further problems are encountered.

One railway has devised what is believed to be a best practice with regards to rail replacement buses for unplanned disruption. An online bus tendering system was set up to improve the alternative transport that they provide, with the operator entering contracts with 59 separate bus companies, and therefore access to over 5000 buses. During an unplanned disruption an SMS is sent out to each company that is signed up to the agreement, notifying them that a new job has been posted through the online tool. The work is administered on a ‘first come, first served’ basis, meaning the companies which respond first are accepted up until the required number of buses is fulfilled, with the costs agreed in the original contract, and not on a per job basis. This has been extremely successful and resulted in the time between disruption and first bus to site reducing from an average of 43 minutes to 34 minutes. In addition, the unit costs for buses decreased by 2-10%.

4.5. Performance Metrics

A range of methods are used by members to report on the customer impact of unplanned disruption. All members undertake either daily or weekly review meetings. Customer satisfaction surveys are a common way of measuring the

customer impact, but these tend to be related to more general customer satisfaction rather than incident specific. Customer feedback is regularly received by some operators which is related to more specific incidents and can be useful as a method of learning what did and did not go well, but still does not provide an overall metric measuring performance. The majority of performance metrics used measure the impact on the train service, with very few customer-specific metrics. For example, seven operators reported that they measure only service on-time performance and punctuality, as well as the number of delayed trains.

There are several other examples of performance metrics used to measure disruption management performance. One member uses a 'passenger affected ratio', which measures the number of passengers affected by over 5 minutes as a ratio of the daily patronage.

Monitoring social media is also a common means of measuring the customer impact of unplanned disruptions. Data can be collected relating to the number and severity of complaints.

A measurement of the average time to site for bus replacement services is used by seven of the fifteen members. Two of these also measure the average time to site for customer service staff to unmanned stations. The provision of timely information is measured by seven of the fifteen members, whilst provision of quality information is measured by eight members. An example of this is measuring the frequency of announcements on trains and stations, as well as the frequency that website updates are captured. One member measures the moment the information is entered in to the system for the website and stations, compared to the time the measure is realized.

One railway grades each incident for each line, and then creates an annual average and line average. The provision of timely and quality information is also rated either 0, 5 or 10 points, and they have a target of less than 2% of complaints from affected passengers. They then use the worst graded events of the year as a case study for future disruption management training scenarios.

Once an incident has occurred it is important to have processes in place to ensure that lessons can be learnt and to enable an improved response for future incidents. Several members undertake comprehensive meetings and team briefings, which include an in-depth review and ensure that staff from all relevant departments have full understanding of events. Where the infrastructure provider is separate these are often undertaken in cooperation with them, as well other major stakeholders and information available from regulators. As Jespersen-Groth et al. (2009) note, the infrastructure manager plays a significant role in the disruption management process, second only to the operator, but different objectives and communication methods can lead to complications. The operators who are most successful at understanding lessons learnt allocate specific actions to department representatives, to ensure that changes are undertaken. It is important to gain an understanding of what methods could be improved, and another successful method of learning from disruptions is undertaking staff surveys, which can be anonymous and allow staff to report what worked well and less well, encouraging action to be taken to improve the process in future.

It was noted that when an unplanned disruption occurs it is important to avoid looking at disruption solely from an operator perspective, and that management should take a holistic approach, particularly focusing on the impact of the individual customer on the ground. In addition, it is crucial that staff have at least as much information as the customers, and to not inform customers of alternative transport options until they are in place and operating effectively.

4. Conclusions

The requirements of unplanned disruption management vary depending on the context of each incident. For example, the location and severity of an incident, the time a disruption occurs and the number of passengers affected. It is crucial that railways are prepared for all possible incident types by planning as much as possible for the unplanned. This includes creating contingency plans which are available to all operational and frontline staff, holding regular training workshops and drills based on previous incidents or possible future disruptions, and having systems in place to allow a fast deployment of alternative transport.

Contingency plans can vary significant in size and form, but it is important that they outline the thresholds for when to implement the plan. In addition, they should state how and when to disseminate information to staff, customers and the media, and what information should be provided such as estimated delay and details about alternative transport.

During an unplanned disruption, the safety of staff and customers should always be the highest priority. In addition, customers should be kept informed as soon as information is declared accurate and reliable. However, staff need to

receive at least the same information and at the same time, to ensure they do not have a knowledge deficit compared to the customer. Alternative route information should also be easily accessible to customers to allow them to complete their journey through other means, if necessary.

Railways should focus their efforts on restoring the service as quickly as possible and minimizing customer impact by focusing on the movement of customers, not trains.

It is important to learn from each disruption that occurs. Performance metrics should be in place to calculate the number of passengers affected and estimate the total passenger delay as a result of each incident. During a disruption, social media should be used to communicate information, but also to gain an insight in to the customer perspective. The information can be very useful for learning what aspects of the disruption were managed well and not managed well. Following a disruption, a debriefing between all involved departments (and infrastructure operator, if relevant) should take place to discuss how to improve the response in future. Surveying frontline staff, and impacted customers, can also be an effective way of gathering information about how successful the disruption was managed.

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