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WHAT DO PASSENGERS NEED OUT OF PUBLIC TRANSPORT INFORMATION SYSTEMS?

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The paper discusses the effectiveness of a Passenger Information System (PIS) which is provided by rail commuter services in *Klang Valley*, Malaysia. Pre-trip, at-terminal or at platform and on-board information are presented. The perceived effectiveness is examined against the socio-demographic profiles of users. Revealed preferences and related travel behaviours are also described. The service users were interviewed during both pilot and actual surveys that took about 4 months in the year 2006 to 2007. Some 583 users were surveyed but only 537 cases were considered as valid responses. The information gathering media were highlighted. Access and utilisation of the information pertinent to delay was tested. Two thirds did not receive any of the listed information and this concurred with the 70% of *NO* decision changes made during incident detection. It is recommended that real-time information media be developed in the long term, with prioritised investments in variable message signs (VMS) and personal messaging for integrated public transport information. In the short term, public address systems reporting on delay duration and alternative modes or routes would suffice. However, on-board information content requirements may vary according to location. Passengers also preferred information on other public transport modes and facilities available while waiting, and to be informed within ten minutes of the events. Accurate, timely and prescriptive information were also considered to be the essence of effective public transport information provision.

WHAT DO PASSENGERS NEED OUT OF PUBLIC TRANSPORT INFORMATION SYSTEMS?

Introduction

The need for public transport information is central focus of this paper. It discusses the research findings of the effectiveness of Passenger Information System (PIS) currently made available to

sub-urban commuter rail users in *Klang Valley*, Malaysia. In particular, the research assesses the access and utilisation of information provided with an emphasis on delay information.

Recent studies on public transport information have dealt with both positive and negative impacts of the provisions. Caufield and O'Mahony (2007) discussed the use of information at different stages of trips. The use was influenced by the existing knowledge, the access to the internet and costs of acquiring the information. The information facilitating users' decisions range from those pre-trip to at-stop or at-terminal information. There are also on-board information and those relating to return or continuing trips. Pre-trip information was important to advise potential users of the choices available for a specific trip, allowing them to make better informed decisions with respect to that journey (Lyons, 2006). Additionally, information has a function to enable users to execute and complete a journey (Lyons, 2006). En-route or at stop/terminal information is sought, for example, to ascertain the predicted waiting time before arrival of the next public transport vehicle at that particular location. This type of information is also useful for wayfindings, especially if the journey involves transferring to another service or mode. Moreover, information on potential or occurring disruptions is important to reduce uncertainty with regards to the expected arrival time. On-board information provision is practical for determining which stop or stations to alight before continuing to reach the final destination. Finally, information on the continuing or return journey will be useful further trip planning and decision making.

Recent works in the realm of public transport investigated the influences of socio-demographic and trip characteristics on the use information. The impacts of information on decisions whether to travel have been very limited. Bonsall (2004) argued for unpredictable behaviour such as abandoning a trip following an acquisition of information regarding a bad traffic or network conditions. The influence on mode decision has also been insignificant. Mode switching behaviour (or future use intention) from private vehicles to public transport use has been recorded to range only from 1% (Littlejohns, 2004) to 17% (Lodden and Brechan, 2004). In contrast, providing information regarding public transport, such as, the estimated journey time or delay duration, would instead induce mode changes from public transport to alternative modes including cars (Balogh and Smith, 1993; Reed, 1995; Caufield and O'Mahony, 2004; Abdel-Aty and Abdalla, 2006). While, there have been limited effects on mode choices, information provision has a greater tendency to influence route choices, especially if the travellers have flexible arrival times (Powell, *et. al*., 1993; Hibino *et. al*., 2005). This has been further supported by Tam and Lam (2005), whereby decisions to adjust departure time if travelling during morning peak hours has been demonstrated in their stated preference survey.

Differences in responses towards information provision were also attributable to the variation in the media of dissemination (Rehrl, et. al. 2007; Caufield and O'Mahony, 2007). It has been argued that for information to have a greater impact on decisions, it should be accurate, reliable, timely, and if possible prescribed to assist users to make better informed decisions (Lyons, 2006). Fujii and Kitamura (2003) observed the changes in mode decisions following better information on public transport tickets. In contrast, repeat purchases by high frequency users had not been significantly influenced information (Andreassen, 1995). Meanwhile, information has been valued relatively high, especially if burden of waiting was reduced (Reed 1994; Chung and Shalaby, 2007). Jen and Hu (2003) reiterated that time and mental efforts to access information had influenced repeat use decisions.

Researches on public transport information systems have also dealt with the issues of mismatched provision and utilisation of information. Natvig and Westerheim (2007) discussed the organisational challenges in developing and operating multi-modal travel information systems. Similarly, Dial ((1995), Hickman (2002) Lyon (2006) and Rehrl, *et. al.* (2007) also emphasised the importance of interoperability of integrated information. Their work discussed the commercial, stakeholding and technical challenges faced by public transport information managers and providers. Bonsall (2004) asserted that information providers should be

responsive to the differing demand for information, the complicated stages of acquiring, comprehending and utilising information and the variation in behavioural changes and compliances to the information supplied.

Westerheim, *et. al*. (2007) and Lyons (2006) distinguished the differences between demand and needs for public transport information. For new users, those requiring to transfers between and physically challenged individuals, information on public transport services and relevant facilities are highly needed. Tam and Lam (2005) and Abdel-Aty and Abdalla (2006) demonstrated the niche demand area for recurring and non-recurring network incidents or disruptions information among public transport users and travellers.

Much of the research has been concentrated on systems available in developed countries, systems, leaving a gap in the literature with respect to information in the less developed nations. It is, thus, the aim of this paper to highlight the some relevant findings, within the context of public transport systems typical of a developing city's.

Trip Information Gathering

A case study was selected to illustrate the access to and utilisation of various information media. In the preliminary analysis, the focus was on the information gathering process at different stages of journeys. In addition, users were also asked to assess the usefulness of delay scenarios information. Passengers of a commuter-rail-system servicing *Klang Valley* conurbation of Malaysia were identified as respondents of a stated preference survey. The users were interviewed during both pilot and actual surveys that took more than 4 months in 2006 to 2007. Some 583 users were surveyed but only 537 cases were considered as valid responses.

Of the 537 respondents, 52% were male. About half were between 21 and 30 years of age. Some 27% were earning below the national average monthly household income of RM2000 (USD 600). About 64% had attended or were enrolled in tertiary educational institutions and while 60% were residing in urban areas with high accessibility to public transport. It was found that some 62% of the users were using the services for commuting purposes, namely to and from workplaces or educational institutions.

Trip information gathering by respondents has been examined. Users were asked about the medium with which they were first made aware of KTM Komuter services. They also indicated the medium accessed for information related to the services at three other stages namely pre-trip, at-terminal or at station and on-board the trains.

As presented in Figure 1, the majority (53%) of these respondents were introduced to the service through words of mouth either from family members or friends, followed by electronic media (16%) and print media (13%). Electronic media are for examples: radio, television, the internet, the telephone and facsimile. Print media included articles or advertisement in the newspapers, magazines, news bulletin or leaflets circulated for the purposes. Other media stated by users included self-awareness due to living or working or shopping nearby rail tracks and having seen the trains passed them by.

Pre-trip information is provided prior to embarking on a journey. These may be provided at home, workplace or other places of trip origin. Examples of information are: routes, frequency, departure and arrival times, names and location of stations, fare rates, operational hours and availability of seats. Figure 2 indicated the media accessed prior to embarking on a journey. The most popular pre-trip medium was the paper timetable (29%). This conforms to the earlier findings by Caufield, O'Mahony, *et. Al.*. (2007). One in five accessed information through the service guide leaflets. The internet was accessed by 6% of the respondents, followed by the telephone (3%). Currently *KTM Komuter* operates the Call Centre from the KL Sentral Station. Other media were words of mouth and some were not using any means to access information.

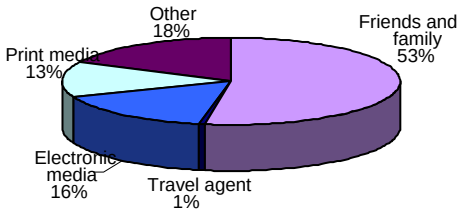

Figure 1: Respondents' First Awareness Medium, n = 537; (Source: User Survey, 2007).

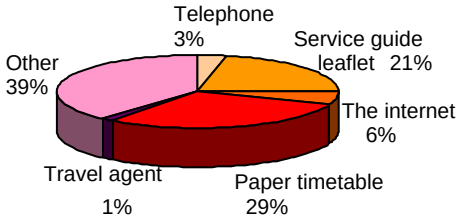

Figure 2: Respondents' Pre-Trip Medium, n = 537; (Source: User Survey, 2007).

At-terminal or at-station information is those provided while waiting for the public transport services during a particular journey. At this points, most of the trip makers have already made some form of travelling, for instances from home to stations or from workplace to the terminals. The types of information provided may also be similar to those of pre-trip information. In addition, information on the respective platform for incoming trains and the direction of travel on the respective platform can be conveyed. Countdown of arrival time and departure times and directions and location of stations/terminal facilities may also be provided.

There were also more choices of information media at the stations, stops or terminals. They include the presence of staff or operators' personnel in and around the stations, ticket counters and machines, at call and information centres as well as information kiosks. Existing and prospective passengers may also be provided with advertisement related to rail services and information on changes or deviation of normal or regular services at this point.

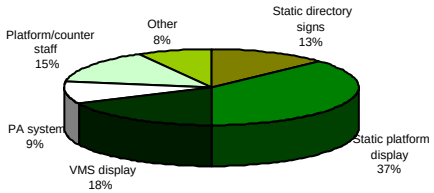

Figure 3: Respondents' At-Terminal Medium, n = 537; (Source: User Survey, 2007).

Figure 3 depicts the distribution of at-terminal media through which passengers acquired updates regarding their trips. In general, at-terminal media provided by the rail operator were printed materials, pre-programmed annunciated voices, actual voice announcements, and personnel stationed to man the ticket and information counters and platforms especially during rush hours. Static platform displays were the most popular media accessed (37%). The pre-programmed variable message signs were accessed by some 18% of the respondents, followed by platforms or counter staff (15%). Other media reported by users were friends and family members accompanying their trips and print media. Some 8% did not access any media but just came to the station to wait for the next arrival of trains.

On-board information is provided on moving public transport vehicles. This may include the current train location, the next station of arrival or departure, interchanges or transfers points and modes, and real time updates on service disruption or deviation. At present, only two types of media through which information was relayed on-board the trains. First was the announcement via the public address system by the drivers as well as on-and-off staff and ticket inspectors on-board. Two thirds of the users surveyed stated that their received information about the journey through drivers' announcement. This was followed by inquiring staff on-board when they were present (17%). The second categories of media indicated were by looking outside the window and asking around e.g. other passengers. The remainder did not access information through any means.

It can be concluded that the existence of varied information media was highly appreciated by users. However, at this juncture no evaluation of their overall effectiveness is made since it is out of the research scope. Service image and goodwill development are two most important areas for rail operators, since the majority of users were attracted to first utilise the service through words of mouth. The small percentage of users made aware by travel agents was reflected in the small number of tourists or visitors.

Pre-trip information was deemed useful for journey planning. Selection of mode, departure time and travel route can be made more efficiently with supply of accurate and reliable information. In this case, paper-based textual or written forms are the best means of conveying the message about rail services. The limited or lack of access to the internet amongst rail users maybe one of the reasons for the relatively lower responses for this type of electronic medium.

Passengers surveyed also stated that they made use of both static and variable messages displayed at station or platform. This means that the strategically located information may be very helpful in assisting existing and prospective users make better travel decisions. Signage and staff have also been utilised by respondents as two means to gather information. However, the lower percentage of public address system amongst users reflected the low frequency of such announcements and also the lack of content in the message delivered. Currently, announcements were made only on the number of platform at which the next train will arrive. In many cases, passengers made some remarks on the inaccuracy of information disseminated through most media stated earlier. This matter will be later discussed.

There was however, a limited means of communicating information on-board the trains. With only two types of media namely drivers' announcement of next arrival station and staff on-board, passengers surveyed received less than appropriate amount of information about the overall journey. This is especially a cause for concern when it involves first timer users and visitors or tourists. All in all, there were some levels of utilisation of media of information. The next subsection illustrates the effectiveness of a selected type of information and its evaluation.

Behavioural Impacts of Existing Public Transport Information Provision: Revealed Preferences

This subsection deals with delay information provided within the passenger information system currently made available by *KTM Komuter* services.

In order to examine the effectiveness of current passenger information system during services disruption or delay, a set of questions were posed to the respondents. The questions deal with the type of information received and travel decisions changes resulting from dissemination of this information. Currently if any delay was expected, the train drivers would make announcements of the delay, usually a scripted information relayed by the station master from the Traffic Control Centre.

Figure 4 (part a) illustrated the types of information received by users and the latter's responses towards the information. It is essential to note that the "NO" category means that no listed type

of information was relayed to users. The listed types of information were information on alternative departure time, alternative route (within the rail-based transportation routes) and alternative public transport modes, all available during the delay information being conveyed. It may not necessarily mean that no information was received at all. The "NOT APPLICABLE" category represents the non-experience of any delay during past journeys among the respondents.

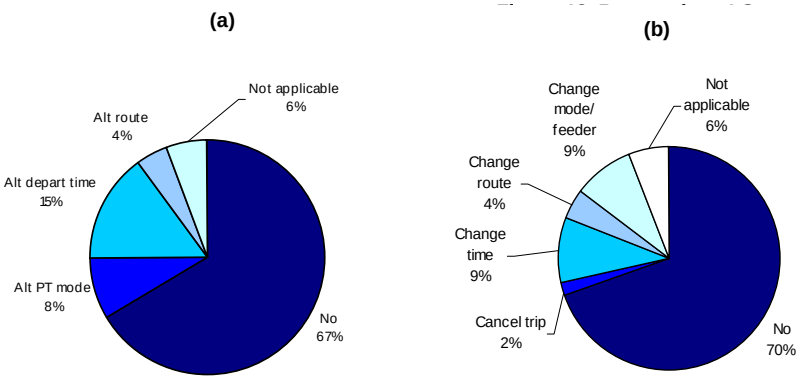

Figure 4: Respondents' Current Delay Info Type; Figure 4(b): Respondents' Current Delay Info Decision, n = 537; (Source: User Survey, 2007).

Based on the current delay information types disseminated to respondents, about two-thirds indicated that no information on any of the listed information was provided in the events of services delays. This high figure corresponded with the high (70%) percentage of non-changing travel decisions made by these users. In 2% of the cases, passengers had decided to cancel the trip altogether during delays.

The corresponding figures (4% and 8% respectively) were cited for the information on alternative routes and the decision changes towards altering routes i.e. using other rail-based public transport services. The relatively small percentage may be attributable to the limited number of possible transfers or interchanges between the five available rail systems in the Study Area. For *KTM Komuter*, the interchanges occurred mostly in central Kuala Lumpur and between less than five stations along the two routes.

This was also true of the trend in information received about alternative public transport modes (8%) and the travel decision changes in terms of alternative (generally feeder or urban stage buses) feeder services (9%). Further revealed preferences made by respondents were those relating to information received about alternative departure. This information largely refers to the time duration or countdown arrival time of the replacement or substitute trains during service delays. Decision changes can also be illustrated by Figure 4 (part b) whereby some 9% changed their departure time after receiving delay information. It is worth noting that the "NO" category within the decision changes included those responses of not changing any part of travel decisions and but may also included waiting for the arrival of next (complementary or substitute) train.

Hence, it can be concluded that despite the limited amount and content of information currently relayed during services disruption, in this evaluation – delays, users were able to make travel decision changes to suit their journey planning and purposes. However, they also indicated during the survey that there needs to be more comprehensive and meaningful delay information as well as elaborated and prescriptive information being disseminated. This issue will be further explained in the next section.

Respondents were also asked regarding their preferences for information media and places or exact timing of dissemination.

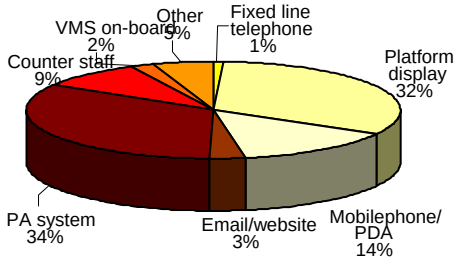

Figure 5: Respondents' Preferred Delay Info Medium, n = 537; (Source: Survey, 2007).

Figure 5 above showed high preferences for delay information to be conveyed through two media. One third respondents each preferred the public address systems and platform displays. This was followed by mobile phones or PDA (14%), indicating potentially high use of telephone communications and personal messaging amongst rails users. Counter staff and other personnel were also deemed helpful (9%).

Only a small number of passengers (2%) selected variable messages on-board. This may be attributable to two factors. First, currently there exists no such facilities on-board and users were not familiar with such technologies. Second, passengers were already en-route the journey or approaching the destination, so any information provided through this means will not be that highly useful. Other means of communication such as email or website (3%) and fixed line telephone (1%) were also not popular among users. The probable reasons for this, are the relatively low of subscribers of fixed line phones and the internet amongst the users as well as the none-existence of such facilities on-board vehicles, at stations or at terminals.

Figure 6 represents the distribution of stated preferences for venue and time of delay information provisions. The majority of respondents stated that they would like to receive it prior to making a journey. About one third preferred this information to be relayed at the terminals or stations. On-board train and en-route to the stations each was preferred by 5% of the respondents, respectively.

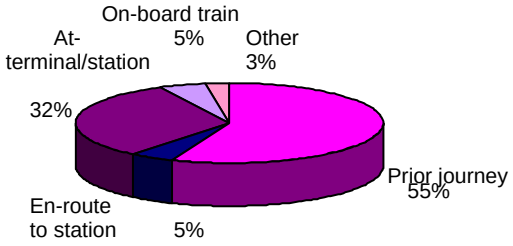

Figure 6: Respondents' Preferred Delay Info Venue, n = 537; (Source: User Survey, 2007).

While many respondents might find delay updates useful, their travel decisions did not changed much, many sticking to the original travel plans. Variation in selected departure time, or alternative public transport modes, direction and route was somewhat influenced by the duration of delay and the media through which the information was conveyed. Users also asserted that the location where they acquired the information would be important in determining their decision for the remaining travel leg. Preferences for media, venue and time of information dissemination also were also not evenly distributed indicating these preferences were made based on the socio-demographic and travel characteristics of users. Information was

found most useful if it can assist in decision making at some crucial points. These instances are prior to a journey or en-route the journey, namely at terminals or stations. The variation in media types for these occasions has been also identified. The provision of information on-board would be most appreciated if it contained some prescriptive alternatives.

Discussions

Discussions in this section centre on the differences in viewpoints between service providers and users of Passenger Information Systems of the case study. The roles of service provider and service users have been identified as essential in ensuring an effective and efficient integrated public transport information system. The perspectives of information provision from the viewpoint of public transport operators and those of the passengers surveyed are, therefore, reported.

In-depth managers interviews were conducted to provide balance to the overall discussion on the topic of delay information provision. Three questions were posed:

1. What types of information on services disruption or delay are currently provided?
2. What types of information on services disruption or delay would users required in the event?
3. What are the future improvements in information provisions that *KTM Komuter* is planning?

According to the managers of the rail company, currently information on delays were in terms of reasons for the delays, which may be contributed by technical failures, track disruptions and disturbance of power supply. For relatively shorter delays, information was relayed to passenger by train drivers through the public address system on-board the train. For long delays, notices were put up at stations or terminal at strategic locations. Voice announcements were also made at these locations such as: at the ticket vending machines and platform counters. Information on delays were transmitted from the disrupted locations to the headquarters office or the Traffic Control Centre at KL Sentral Station. This information will also be updated by the respective Station Masters or Managers. Real time information provision was facilitated by long-line communication and signaling equipments. For persistent extraordinary delays, media releases via print and electronic means such as the radio, television and newspapers was made. However, the information content was limited to the existence of such delay and the reasons for delay only. No other descriptive and prescriptive information was offered. The managers also acknowledged that some of the public address announcements were unclear due to the infrastructure maintenance and non-standardised specific interval of announcement existed as operational procedures.

Managers showed high comprehensions and considerations of the expected types of information deemed useful by users. One manager even tried to put himself in the shoes of passengers when dealing with this issue. Generally, managers expected rail users to seek updates on the duration of the delay and the estimated time when the services will resume to normal conditions. They would also expect details such as the arrival time of the next available or supplementary trains, the alternative modes or route to their final destinations and other prescriptive information upon which impromptu travel decisions can be based. Nevertheless, managers viewed that users should be informed as soon as possible. In this respect, real time information should be disseminated for an interval of 8 to 10 minutes. The interval calculated was based on the headways of rail services.

Moreover, the media thought to be most useful to passengers were voice announcements, notices and visual/textual information. It was stressed that informing on delays alone was insufficient. Using ICT and advanced technological media, passengers should be assured of the availability and reliability of the system. Users, according to the managers, would prefer to be informed of the reasons for delay such as power supply or track disruptions and EMU

breakdown. Awareness of the reason for delay can help users make better and more informed decision for their continuing or connecting journeys.

In response to the last question, managers indicated that there were some degrees of planning and development in passenger information systems. However, in the short term, these proposals were not prioritized. There were other issues deemed more important namely the reduction in annual budget allocation for rail services. At present, the company was heavily subsidised by the public sector. Priority was made on the addition of new rolling stock and EMUs.

Nevertheless, the company was planning, in the longer term, to provide more sophisticated LCD and TV screen monitors, informing in real time about delays. Comparative studies have been made with other systems in the region such as Singapore and Japan. Updated information with useful contents may be relayed in the future through visual means such as LED message boards or displays. The present, single line, pre-programmed static LED boards should be replaced by real time, multi-line dynamic or variable ones. This was to be supported by effective signaling and communications infrastructure, which interfaces can be controlled by the headquarters and each station. Signages (notices) at stations should have immediate impacts and be of high visibility and legibility levels. Existing policies and standardised procedures should be regularly reviewed and updated, based on public users' feedbacks.

Table 1: Types of information preferred by respondents, n = 252; (Source: User Survey, 2007).

formation	Percentage of Respondents' Preference
Schedule	9.2
Accurate Info	2.8
Alternative Mode	8.8
Alternative Route	2.8
Realtime / Announcement	7.2
VMS Display	2.4
Delay Info	21.6
Safety / Security	2.0
Staff	0.4
Time of Departure and Arrival	17.6
Fare	1.2
Journey Info	3.6
Facilities	2.8
Location / Direction	17.6
VMS Onboard	2.0

Users' perceptions on a more effective passenger information system may be illustrated by the Table 1 above. Only 252 of the 537 or 47% valid responses were used. The percentage concurred with Lyons' (2006) findings regarding in-trip information seeking behaviour. Of this 47%, one in five who answered, sought information on delays. The departure and arrival times as well as location and direction during travelling were also highly sought by users (17.6% each). Other types of information deemed essential in travel decision making processes were rail services schedule (9.2%), alternative mode during services disruptions (8.8%) and real time announcements on delays (7.2%). These were followed by information about the journey, station or platforms and other facilities offered by *KTM Komuter*. Variable message displays on-board was also sought by some 2.4% of the users surveyed. In particular, respondents complained about the inaccuracy of information, usually with respect to the estimated arrival and departure time. It was acknowledged by many that delays were a major problem and this has not been truly reflected by current information provision e.g. scheduling. A specific

analysis would be made, in another venue, of the type of information requested in terms of delays. The listed preferences stated by respondents are listed, in no particular order, in Table 2.

Table 2: Preferred Types of Information About Delay; (Source: User Survey, 2007).

1.	Reasons for delay
2.	
3.	Estimated duration of delay
4.	Alternative mode available
5.	Other PT mode situation during event
6.	Alternative route available
7.	Facilities while waiting due to delay
8.	Inform REALTIME, within 10min of disruption
9.	Inform prior to a journey, at platform
10.	Reduce technical problems
11.	Accurate info, to relieve anxiety
12.	Feeder facilities introduced at next station

It can be concluded that the information currently provided was insufficient from both the users' and providers' viewpoints. Passengers required more information, especially the comprehensive and useful ones. Descriptive and prescriptive information as well as the possibility of real time information updating were considered essential for en-route travel decision making processes. Examples of descriptive information are reasons for delay, estimated time of resuming to normal service conditions and location of delays. Information such as alternative modes and routes available, and the estimated arrival time of the next available trains service in both directions can be also prescribed.

There were, however, conflicting views on how severe the problem of delay was and how immediate the remedies needed to be acted upon between users responding to the survey and the managers of the company. This may be due to the prioritisation of needs and capacity of both parties (Lyons, 2006). This issue will be considered accordingly. Next, general conclusions will be drawn from the findings and recommendations raised.

Conclusions and Recommendations

Based on the findings and interviews, it is recommended that the media and types of information be planned and improved within two periods of time: the long and short terms.

Table 3 below depicts two periods during which improvements are to take place. Passengers sought variable information with comprehensive and useful contents. It should be easily comprehended and prescriptive in nature so that travel decisions can be facilitated during delays.

However, the media through which the information can be disseminated varied in preferences based on: individual levels of comprehension and visual legibility, the location where information was provided and the journey stages at which passengers were to be supplied with the information. In short, passengers required information to be updated in real-time, accurate and reliable most of the time.

Managers have acknowledged the essential steps to be taken to increase confidence among users and customer loyalty. Even though there was no immediate plan to invest in many passenger information system equipments, the rail company has a longer term planning for this type of improvements. At present, the operators were looking at improving the existing information delivery systems as well as the contents of information.

Table 3: Recommended Long and Short Terms Improvements of Passenger Information System; (Source: User Survey and Managers' Interviews, 2007).

Issue 1: issues persistent (retain existing users, increase use frequency, attract new users, instill confidence)	*Long term*: Investment in rolling stock, *KTM* own feeder bus network *Short term*: Accurate info to reduce anxiety, facilitate decision making, prescribe alternatives
Issue 2: Real-time information media requirement (facilitate existing users' travel decision making processes)	*Long term*: Investment in VMS, users personal messaging all PT mode INTEGRATION *Short term*: PA system improvements Reduction in delay duration, Prescribe alternative modes/routes

Selection of media in the future should be made accordingly based on passengers' feedback. With the advancement of ICT, more personal and prescriptive information should be supplied in the near future. Investments are now prioritised on rolling stocks to reduce backlog of trains units being repaired and maintained. In the long run too, *KTM Komuter* should be looking into integration of physical assets such as feeder buses under their own management. A longer term plan is for the eventual integration of all public transport modes, in its truest sense.

Meanwhile, in the short term, passengers' anxiety and curiosity must be addressed. To retain existing users and capture new prospective ones, the operators must instill higher confidences and reliability with respect to the existing services. Accurate information and prescriptive information such as alternative modes, routes and direction of travel must be disseminated. The Public Address system must be regularly maintained to ensure its prolong efficiency. Delays should be reduced with proper and regular maintenance of the EMU sets and other physical infrastructure such as rail tracks and signaling and communication networks.

This study discussed the responses of user towards incident information provision on-board public transport vehicles. The influence of passenger information systems on users' travel behaviours and decisions has been indirectly implied. The socio-demographic and travel characteristics explained a little bit about whether and how passengers utilise the existing public transport information systems. The research findings concluded that there was a high level of requests and needs for the integrated multi-modal public transport information systems. They could be developed and implemented based on the recommended time frames.

To reiterate, despite the lack of quality and contents of delay information, passengers were still able to make alternative travel decisions, albeit with lack of confidence and mostly ill-informed ones with regard to public transport usage. While the operator may be restricted by limited or tightened budget allocations for more new investments in this area, the existing systems should be improved. This is crucial in times of service disruptions, because passengers would not like to be made to wait and waste their precious time, let alone left uninformed about the situations.

To summarise, prescriptive information should be supplied to facilitate users' decisions making processes. Otherwise, the services might be loosing its attractiveness and later would experience some declines in overall patronage. It is, therefore, recommended that real-time information media be developed in the long term, with prioritised investments in variable message signs (VMS) and personal messaging for integrated public transport information. In

the short term, public address systems reporting on delay duration and alternative modes or routes would suffice. However, on-board information content requirements may vary according to location. Based on some qualitative responses of the survey, passengers have indicated that they preferred information on other public transport modes and facilities available while waiting, and to be informed within ten minutes of events. Accurate, timely and prescriptive information were also considered to be the essence of effective public transport information.

To end, the research has successfully examined the access and utilization of public transport information, and the findings can assist the operators to make its services more effective integrated. Further research on the differing effects of varied contents of information and on the crowd management during services delay are, therefore, suggested to ensure a more comprehensive and deeper study on any behavioural impacts. This is in line with those mooted by past researches and by many public transport operators and company, in order to facilitate organisational decision makings.

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