

# FEASIBILITY OF AN INTEGRATED OPERATION SYSTEM FOR ACCESSIBLE TRANSPORT SERVICES

LUK, Rex

The Hong Kong Society for Rehabilitation, Hong Kong  
[chikeung.luk@rehabociety.org.hk](mailto:chikeung.luk@rehabociety.org.hk)

LAI, Patrick

The Hong Kong Society for Rehabilitation, Hong Kong  
[patrick.lai@rehabociety.org.hk](mailto:patrick.lai@rehabociety.org.hk)

## SUMMARY

The Hong Kong Society for Rehabilitation (“HKSR”) had engaged an external consultant firm to conduct a study of the existing operations of the accessible transport services and then to evaluate the feasibility of implementing a new integrated operation system.

The study showed that a new integrated operation system applying pertinent Information and Communication Technologies (“ICT”) to enhance the efficiency and effectiveness of the operations is for the benefits of the people with disabilities who need to use the accessible transport services.

The staff and the management would be benefited by automated operation processes which would save time and effort, better monitoring of service quality, as well as timely and accurate reporting functions. The strengthened IT infrastructure would enable the operations to match with future growth and demand of the services. It would also be beneficial to the whole society through better utilization of the limited resources.

**Key Words:** accessible transport; operation system; feasibility study; Information and Communication Technologies

## INTRODUCTION

The Hong Kong Society for Rehabilitation has been operating three types of

accessible transport services in Hong Kong, namely, Rehabus (“RB”) for all people with mobility difficulties (under government subvention), Easy-Access Transport Services (“ETS”) for frail elderly patients to public hospitals and clinics and Accessible Hire Car (“AHC”) for wheelchair users. The 3 fleets together have about 170 accessible vehicles in service.

Owing to the differences in time of commencement, funding source and market segmentation, these 3 fleets were operating independently and separately, i.e., each with its own call centre, operators and information database. However, their request handling and operation processes were quite similar to each other.

## **PURPOSE OF THE STUDY**

The purposes of the study were to review the existing operations of the various types of accessible transport services provided by The Hong Kong Society for Rehabilitation for the people with disabilities in Hong Kong, and to evaluate the feasibility of developing and implementing an integrated operation system to enhance the operational efficiency, effectiveness of the services by adopting up-to-date Information & Communication Technologies.

## **METHOD**

An external consultant firm was engaged to work together with a team of staff from HKSR, to conduct a study of the existing operations of the accessible transport services and then to evaluate the feasibility of implementing a new integrated operation system.

The study team had examined the existing systems and the actual daily operational processes by on-site examinations and interviewing the operation staff, the management team and other stakeholders to collect the comments and expectations in order to locate areas for improvements. The consultants evaluated the feasibility of applying Information & Communication Technologies to suit the needs and thus proposed an integrated operation system.

## **RESULTS**

From the study, it was proposed to implement an integrated system comprising a Vehicle Management System applying the GPS technology, a Passenger

Management System using RFID system, a Call Management System allowing online booking, and an integrated Fleet Management System after the review of the current operation systems and processes.

The expected benefits of the new system would include providing an innovative user-friendly One-Stop-Shop Call Centre and an E-booking system to persons with disabilities and transport difficulties for accessible transport services; increasing efficiency to meet the unmet demand for the services; enhancing passenger safety; and improving service quality through more efficient management and utilization of resources.

The new integrated system would be technically feasible and financially viable. As a result, it was recommended to start the implementation as soon as funding would be available.

## **DISCUSSION**

### **1. LIMITATIONS**

This study was carried out mainly based on the information gathered through site-visits, interviews, meetings and discussions with staff of HKSR. Due to time limitation, the study team had not contacted the end users for the customer's view on the proposed new functions or else what service enhancement they expected.

Though the study team had tried to gather as much reference as possible, some information and figures were estimations or projections.

### **2. FINDINGS**

Based on the information collected from the interviews with various sections of HKSR, the following summaries the findings:

The existing systems of the 3 fleets were implemented as separately; each to tackle a specific service requirement. Without system integration, extra time and efforts were required for duplicated data entry and statistical compilation.

Difficult to collect data for analysis - the current operation systems which were separately developed, only assists the operation on the order booking part. Drivers'

job ordering, vehicle arrangement and actual job record details capturing were still manual that heavily rely on paper and spreadsheets. Without a comprehensive database on customer orders and driver job records, management could hardly extract statistical data efficiently and dynamically for report generation and future business planning.

The actual service details of passengers and vehicle utilization pattern came from the job sheets being filled in by drivers manually. The manual preparation of job sheets and relating records imposed heavy workload to drivers; this also induced another batch of time-consuming manual processing when the job sheets were submitted to the Finance Department.

The management would not be alerted for vehicles which were idle for a period of time, in an unauthorized trip, slow driving or exceeding a certain speed limit, it relied on vehicle drivers' self discipline.

The locations of passengers could not be identified; the family members of passenger need to call the call centre or drivers by phone in case of urgent matters.

The call centres had limited telephone lines and the Interactive Voice Response Systems (IVRS) had limited capacity, which necessitated the use of pager and the need to check for missing calls. Customer services also need to call back clients to confirm booking and notify driver and vehicle information, which was time-consuming as the clients may not be contacted for the first call and need to be called repeatedly.

## **4. PROPOSED SOLUTION**

### **4.1 Vehicle Management System (VMS)**

The VMS would apply Global Positioning System (GPS) which provides reliable location and time information in all weather and at all times and anywhere. This technology included hardware of GPS device and web-based software (used in PCs or portable phones) to provide summarized and detailed fleet data in user friendly charts, graphs and reports.

With VMS, the workload for vehicle drivers in preparing job sheets and related documents would be reduced. Less paperwork would help lowering the turnover rate of drivers. The driver attendance records (which can be used to calculate

overtime), job order details, such as vehicle number, vehicle operation date and time, mileage, route details in respect to time, usage of tunnels per trip (the tolls fee per trip can be identified) can be automatically captured and no manual interaction is required. The report data can be exported to Excel spreadsheet for further analysis.

Besides, VMS can provide a monitoring platform for management to spot out the delinquent staff. The system can send alert in form of email or Short Message Service (SMS) to management staff when the vehicle is idle for a period of time, in an unauthorized trip, slow driving or exceeding a certain speed limit. Ad-hoc alerts can also be defined by the management staff.

In addition, driver safety figures with speed monitoring can also be obtained from daily vehicle tracking reports or system alerts. To further enhance internal communication, VMS can have real-time communication device installed in vehicles so that drivers and customer service centre can have instant dialogue in case of emergency deployment.

Furthermore, ad hoc job dispatching would enable instantly dispatch orders to specified vehicle driver in case of special needs or emergency through SMS order details (customer name, pick up and take off time and location) to their portable phone.

#### **4.2 Passenger Management System (PMS)**

The PMS would apply the latest Radio Frequency Identification (RFID) technology. It would include the use of a Passive RFID card applied to a passenger for the purpose of identification and tracking using High Frequency (HF) radio waves. An RFID reader (desktop or portable) can simultaneously capture all raw data stored in each RFID card within the reading range.

This solution can reduce the manual interaction of vehicle drivers to keep passenger statistics and significantly simplify the data capturing procedure and increase data accuracy. The turnover rate of drivers due to the paperwork may also be trimmed down.

Each passenger would be given a RFID card for identification. The passenger on-board and take-off time can be captured instantly by placing the RFID card near the reader or the vehicle driver use a portable reader to scan through the card for

disabled passengers during on-board or take-off of the vehicles. The driver would scan through a spare card in case a passenger forgets to bring the card.

It would lessen the workload of the drivers' manual paperwork and improve the data correctness for preparing the daily job sheet information, such as passenger on-board and take-off time, passenger name, number of passengers on-board (including accompanies), etc. To achieve a higher customer service satisfaction, PMS can have real-time synchronization of RFID data to server (together with VMS) to provide a full picture of passenger tracking, i.e. current location of passengers can be spot out easily.

### **4.3 Call Management System (CMS)**

Call management is essential for good customer service. A new Call Management System applying up-to-date technology would replace the existing Interactive Voice Response System (IVRS) to resolve the problem of limited capacities.

With the latest IP communication technology, a unified Call-centre suite would include multi-channel Automatic Call Distributor (ACD), new IVRS, Computer Telephony Integration (CTI), predictive dialling, interaction history, recording, reporting, and administrative tools.

An auto-dialler together combining Text-to-Speech technology would be used to make telephone calls to customers to reconfirm orders and to inform order details in an automatic way, saving some manual effort and time of the customer service representatives..

In addition, there would be an E-platform to allow submission of electronic forms and status checking through the internet by the public or internal staff, e.g. applications, praise/complaints, internal reports for follow-up, as well as job sheets printing by drivers in depots.

It would support the increasing customer demand and provide management of calls directly by customer service operators at their workstation computers via a digital data network and call logging facilities for in-coming and out-coming calls monitoring. Information and reports regarding the performances of the system and customer service representatives would also become available.

#### **4.4 Process Re-engineering**

With the new systems, it would also be necessary to conduct a process re-engineering exercise to re-design the whole business and operation processes for optimized efficiency.

For instance, in the future, incoming orders would be centralized. A clear enquiry of vehicle status can be achieved. When an incoming order is received, call centre can make enquiry and submit order in the system. Notifications to customers will be sent automatically. It would prevent missing orders or duplicate orders due to manual notify client's request by 3 separate systems. Passengers would do verifications on the vehicle. The call centre would capture order status simultaneously. Then, HKSR would capture information such as time spent on each order more accurately which statistics can be used to forecast future services demand and resources allocation.

### **5 COST ESTIMATION**

It was estimated that the initial investment cost including the costs of the hardware such as the computer servers, equipment on board the vehicles, smartcards for passengers, the software, i.e. computer programs to be purchased, licensed and developed, as well as the labor for the installation, setup and implementation, would be about HKD15M. The maintenance costs for hardware and software of the systems would be estimated at around HKD2M per year.

### **6 BENEFITS**

#### **6.1 Efficiency gain**

Database of bookings in 3 fleets under Call Management System would be shared. Real-time checking of orders of all 3 fleets would prevent clients from placing duplicate orders in different fleets. It was estimated an extra of about 200 orders would be served from the efficiency enhancement each month.

The real time job dispatching through touch screen display panel installed in vehicles can allow ad hoc booking directly sent to nearby vehicle. It was estimated that another 60 orders would be served each month.

PMS would also help monitoring the patronage and thus encouraging passengers to

make a better use of the services.

With GPS and GIS technologies, the current location of vehicles can be identified for ad hoc job dispatching. It was estimated that there would be about 60 ad-hoc orders each month.

Manual job sheets can be replaced by statistical information automatically captured from GPS and RFID devices, such as mileage, passenger pick up and drop off time, passenger pick up and drop off locations, number of passengers on board etc. A sample survey with drivers shows that on the average 25.18 minutes were spent in filling required forms. It was expected that around 40% of that amount of time (i.e. about 10 minutes) in manual recording work for each driver per day would be saved.

Summing the above, it was estimated that an extra of approximately 33,000 passenger-trips would be served each year from implementing the new system.

## 6.2 Service improvements

The areas of service improvements are summarized below.

Item	Description	Current	Target
Customers can check by the One-Stop-Shop	No. of calls each customer has to make to check the 3 fleets for availability	3 calls	1 call only
7x24 E-booking system	Service Time for customer booking	Office hours	7x24
Real-time monitoring of vehicles	Checking of vehicle locations	By calling the drivers	Real-time GPS system
Real-time information of passengers	Checking of passengers	By calling the drivers	Real-time RFID system
Job dispatch to on-board monitors directly	Job dispatch	Job-sheets printing in advance	Real-time information onboard

Table 1: Areas of service improvements

## 6.3 Savings in manpower

By using the auto-dialler and e-platform of the CMS, there would be saving in the time

and effort of the customer services representatives in making calls to customers to reconfirm orders and to inform order details.

In addition, some of the effort for handling those calls from customers or their families to checking the status of the vehicles and passengers, especially at times of bad weather conditions, would be saved.

#### **6.4 Enhanced vehicle monitoring and safety**

With the use of Vehicle Management System with on-board cameras, GPS, etc, the monitoring of vehicles and safety would be enhanced.

#### **6.5 Increase in revenue**

There would be an increase in the fare collected respectively from the extra orders to be served each year.

#### **6.6 Saving in vehicle investment**

It was estimated that the extra of around 33,000 passenger-trips to be served each year would be similar to the services of about 5 vehicles.

#### **6.7 Data accuracy and timeliness**

With the aid of automatic capturing devices, the accuracy and timeliness of data collection regarding bookings, orders, customers, drivers and vehicles would be further enhanced. This would allow more timely and accurate information for statistics and reports for the analysis to improve the efficiency of the service operations.

#### **6.8 Other savings & benefits**

With the electronic means of data input and reporting, less paper and printing, such as pre-print forms as well as paper and printing ink would be used. It would also be better to our environment by consuming less paper (trees).

After the implementation of the new system, the maintenance costs of some existing systems and hardware would also be saved.

## **CONCLUSION**

In conclusion, a new integrated operation system applying pertinent Information and Communication Technologies to enhance the efficiency and effectiveness of the operations would be for the benefits of the people with disabilities who need to use the accessible transport services.

The staff and the management would be benefited by automated operation processes which would save time and effort, better monitoring of service quality, as well as timely and accurate reporting functions. The strengthened IT infrastructure would enable the operations to match with future growth and demand of the services. It would also be beneficial to the whole society through better utilization of the valuable and limited resources. The new integrated system would be technically feasible and financially viable. Therefore, it was recommended to start the implementation as soon as funding would be available.

## **REFERENCES**

IT Industry Development Division, Hong Kong Productivity Council, 2011. "Feasibility Study on EC-Access Systems for Accessible Transport Services".

<http://www.rehabsociety.org.hk> for information of Accessible Transport and Travel services provided by The Hong Kong Society for Rehabilitation. Accessed in 2011 & 2012.