Jordan's electronic transit monitoring and facilitation system

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Abstract

Like most countries with numerous international borders, Jordan has adopted a number of different approaches to managing transit traffic over recent years. Developing a secure and more facilitative approach to transit traffic and cargo has been a high priority for the Jordan Customs Department. The electronic transit monitoring and facilitation system has led to a significant reduction in the cost of moving goods through Jordan as there is no longer a requirement to travel in convoy. As transit traffic has increased, the number of smuggling attempts has decreased while at the same time transit journey time has reduced by more than 60 per cent. This article provides an insight into the operation of the system as well as providing some analysis of the system statistics.

1. Background

Transit trade involves the movement of goods across borders with duty unpaid and in most cases, without physical inspection. This raises the danger of smuggling the goods within this cargo to the internal market of the country, and the possibility of smuggling dangerous materials such as narcotics or explosives during the transit trip.

Most countries implement strong measures to avoid these dangerous consequences of transit cargo trade and to achieve better control of customs duties. These measures include high guarantees to ensure the customs duties are paid and sometimes include physical inspection of the cargo before allowing it to cross the country. In Jordan, in addition to these measures, the trucks are escorted in groups of 50 to 100 during the journey. These measures result in delays (10 to 24 hours) to the trade across borders and do not guarantee the safety of the country from possible well planned smuggling.

2. Jordan Customs Department's pioneer project

Transit trade in Jordan contributes to the national economy and presents a major means of smuggling. Annually, hundreds of thousands of trucks cross the country as Jordan is the main trade route between the Arabian gulf countries, Africa and Europe (see Figure 1).

The main goal of Jordan Customs is to use a tracking system to improve control over the transit shipments as well as preserve the integrity of the goods sealed in the shipment – without affecting trade facilitation and without sacrificing security.

The idea of using tracking technology to manage the transit trade in Jordan was first introduced by the telecommunication directorate at Jordan Customs in 1997 along with a centralised video monitoring system. The limitations of tracking technology at that time and the lack of an electronic map of Jordan delayed the realisation of this idea. Jordan Customs continues theoretical studies and investigates available technologies with the aim of facilitating trade without sacrificing security needs. Many pilot projects and

experiments have been conducted using tracking technology for this purpose, and the outcome was a detailed Request for Proposal (RFP) leading to a public tender in late 2006, and implementation in late 2008.

Figure 1: Middle East map (Jordan at the centre)

3. Practical considerations

The published RFP summarised the expected outcomes of the theoretical and practical studies conducted by Jordan Customs and included details of the technical and operational requirements needed to utilise tracking technology for customs purposes.

Choosing a tracking system for fleet management is not complicated and can be readily found in the market. However, applying tracking technology for customs application presents many complicated issues that need to be resolved and handled carefully to guarantee the success of the system, as tracking technology alone cannot handle customs requirements. The proposed solution needed to address the following issues to be successful:

1. To avoid tampering with goods, a proper seal needs to be installed on truck and/or container doors.
2. To avoid separating trailer from tractor, proper seals are needed to tie the trailer to the tractor.
3. The system should be able to import and export electronically the customs declaration data from an automated customs system.
4. The tracking unit should be portable, easy to install and remove in minimum time (less than two minutes), have a rechargeable long-life battery, sufficient to complete a trip from the entry border to the exit border taking into consideration the time allowed to be spent in country, and have a tampering alarm.
5. The seals should communicate by wireless with the tracking unit and send an alarm when tampering occurs.
6. The system should be fast, reliable, secure, fully supported and incorporate hot standby with reliable GSM and Wi-Fi communications.

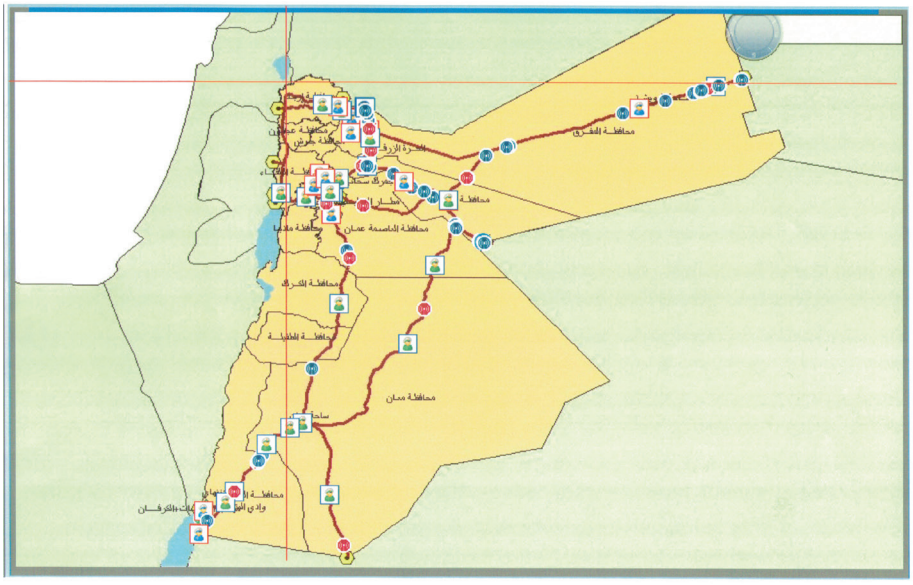
The RFP also indicated that the system must allow customs authorities to monitor simultaneously on a real time basis (see Figure 2) thousands of shipping trucks from a central control room that is equipped with large wall monitors (see Figure 3). As well, the system must report, on a real time basis, any predetermined events when they occur. The position and status of the truck should be monitored on real time bases, based on predetermined time intervals or distances. As the trucks will be allowed to travel separately without physical escorts on predetermined routes, electronic geo fences will be established around these routes and around the areas that have some potential to be used for smuggling. An alarm should be sent to the control room in case any of the trucks divert from the pre-assigned route. As initiating a transit trip by the system starts at the entry border crossing by installing the tracking unit and the electronic seals, assigning a transit route and determining the exit border crossing point at which the tracking unit and the seals will be removed and the transit trip terminated, a trip report must be produced electronically at the control room. This report must include all violations committed during the transit trip.

4. Implementation and technology

Jordan's electronic transit monitoring and facilitation system uses GPS technology to locate the position of the trucks being monitored. GPRS/SMS technology is used for communication between the tracking units and the control room. RFID technology is used for communication between the tracking unit and the electronic seals to secure the shipment's door and to avoid separating the tractor from the trailer. Digital maps (vector and raster) are used to provide graphical interface to the user to enable the operator to follow up truck movements. The MIS/CIS is used to provide statistics and reporting, and to interface with other existing computerised applications to avoid duplication in data entry, wireless networks and PDAs are used at the customshouses to initiate and terminate transit trips.

The tracking operation starts at the customs entrance centre. After the transit truck completes all customs procedures, the truck moves to an electronic tracking yard located just before the exit gate; a tracking unit and electronic seals are configured and installed on the truck and the transit route which the truck will follow is assigned. The unit is identified by the system at the control room and the truck appears on the main monitoring screen.

Figure 2: Online monitoring of transit trucks



During the transit trip, the truck's position is updated at pre-assigned way points based on a computerised risk analysis system – the duration can be short for high risk shipments and longer for low risk shipments. Any violation committed during the trip is reported immediately to the control room.

When the truck reaches the customs exit centre, a trip report is issued by the system that shows the route that has been followed and any violation that may have been identified during the trip. The report is analysed by a customs officer who will terminate the transit trip and remove the tracking unit and electronic seals. The tracking unit is then recharged for use on another trip in the opposite direction.

5. Violation handling

If a violation is committed by the truck driver during transit trips, such as diverting from the pre-assigned route or tampering with the goods or stopping in prohibited places, an alarm is initiated in the main control room and the nearest available patrol car along the transit route moves to investigate the violation and report to the control room.

Figure 3: Main Control Room

Jordan Customs manages and oversights all international transit moving through Jordan. In the period January 2010 to June 2010, there were 87,738 transit vehicles. The table below shows the number of vehicles that were monitored and the various customs centres that were involved in the transit process.

Table 1: Overall transit traffic

Customs Centre	Jaber	Omary	Zarqa-Free Zone	Amman	Modawara	Aqaba	Karama	Sahab	Total
January	5204	2740	336	38	42	2191	2	17	10570
February	4333	3880	343	56	38	1912	1	31	10594
March	5056	7056	367	109	44	2430	2	66	15130
April	4992	7269	318	43	59	2260	0	51	14992
May	6441	7683	334	44	49	2158	6	63	16778
June	7951	8329	401	32	53	2826	12	70	19674
Total	**33977**	**36957**	**2099**	**322**	**285**	**13777**	**23**	**298**	**87738**

Important violations committed for the period from June 2010 to October 2010 have been investigated and Table 2 shows the result of this investigation.

Table 2: Violations in transit trips

	Number of transit trips	Diverting from transit route	Tampering with the tracking unit and the e-seal
Number	95,133	10,375	1,189
Percentage from total number of transit trips		11%	1.2%

Research indicates that most truck drivers who divert from the transit routes are looking for short routes or attempting to avoid traffic jams. Many of the drivers who remove the tracking unit from their vehicle are actually looking to protect the device from theft while they are on authorised stops.

6. Effect on smuggling

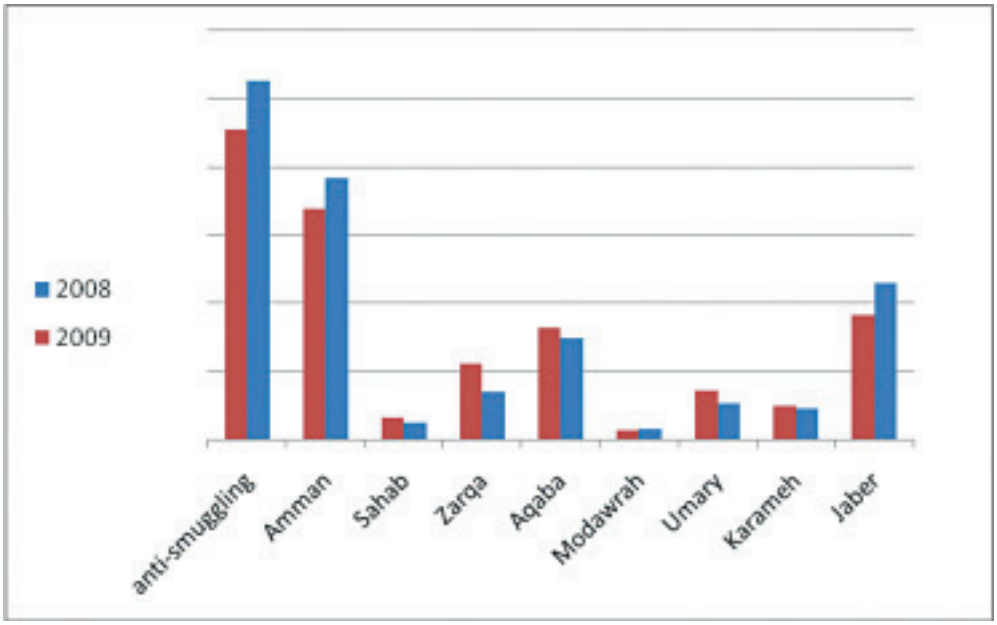
To measure the effect of the electronic tracking system on smuggling in transit trade, a comparative study of the smuggling cases (attempts) for the years 2008 (before the application of the tracking system) and the year 2009 (after the application of the tracking system) has been conducted. The following factors were taken into consideration when analysing the statistical results of this study:

- Ninety per cent of the transit trade was concentrated between Jaber, Umary, Zarqa and Aqaba customs centres.
- The high-risk cargo was concentrated in the following transit routes:
  - Started from Jaber customshouse and ended at Umary and Zarqa customshouses
  - Started from Aqaba customshouse and ended at Zarqa and Karameh customshouses.
- Anti-smuggling directorate mainly concerned in the smuggling cases along the transit routes.
- The transit tracking system was applied on the external transit (cargo crossing the country) as well as internal transit (directed from the external to the internal customshouses for inspection).
- The tracking system started operation gradually in January 2009.
- These statistics were for the transit customs centres where the tracking system had been applied.

Table 3: Number of smuggling cases at customs centres, 2008 and 2009

Year 2008	Year 2009	Customs centre
1147	916	Jaber
224	243	Karameh
268	360	Umary
72	70	Modawrah
745	819	Aqaba
351	559	Zarqa
124	161	Sahab
1920	1694	Amman
2630	2280	Anti-smuggling
7481	7102	Totals

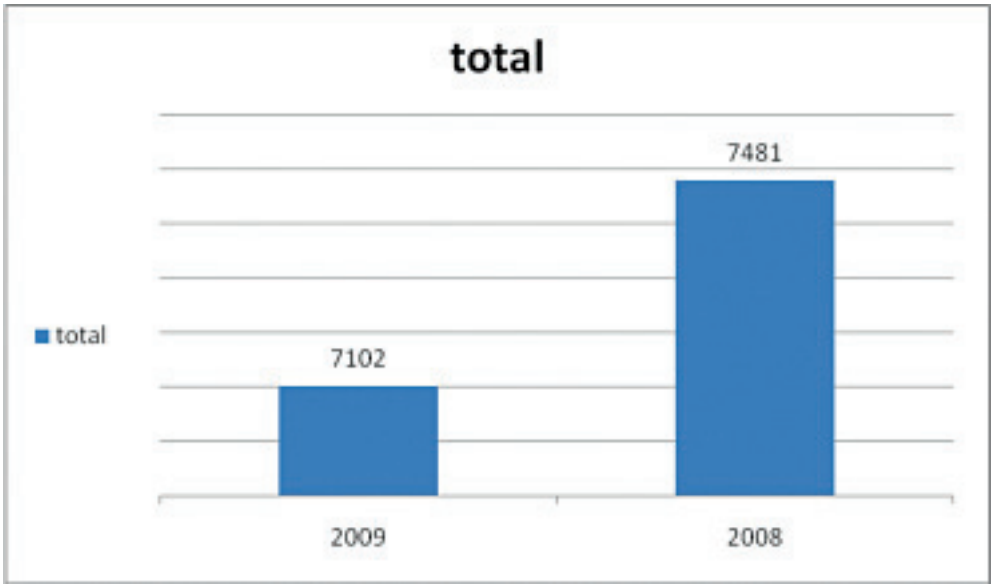
Figure 4: Smuggling cases, 2008 and 2009



Based on the abovementioned statistics and factors, we can conclude the following:

- Smuggling cases during the transit trip have been reduced; this explains the decrease in smuggling cases for the Anti-smuggling Directorate in 2009.
- Smuggling cases inside the destination customshouses have increased, as can be seen in the increased number of smuggling cases in Umary, Zarqa and Karameh customshouses in 2009.
- As Aqaba is a free economic zone and due to the application of the tracking system on almost all containers leaving the port, it became difficult to smuggle goods during the transit trip, hence more smuggling attempts were discovered within that zone, this explains the increase in smuggling cases in Aqaba in 2009.
- Figure 5 shows that the total number of smuggling cases decreased in 2009 compared to 2008. The main factor for this decrease is the application of the transit tracking system.

Figure 5: Comparison between the total number of smuggling cases for 2008 and 2009



7. Results

The introduction of this system by Jordan Customs has proven to be very useful:

- The need to escort transit trucks has been reduced by more than 90 per cent – only bulky and high duty goods are escorted.
- Truck congestion at the customs yard (where the trucks used to wait for the formation of a convoy) has been eliminated.
- Transit trade across Jordan has been increased by more than 80 per cent.
- Security has been enhanced with more control over the trucks while they are in Jordan.
- A major problem at Aqaba container terminal has been solved: the containers are tracked electronically from the terminal to the internal customshouse for physical inspection instead of inspection at the terminal, which reduces the waiting time for the containers at Aqaba port.
- Transit journey time has been reduced by more than 60 per cent, for example, the transit trip from Jabber at the Syrian border to Omary at the Saudi Arabian border has been reduced from an average of 8 hours to an average of 3.5 hours, and from Aqaba to Bagdad (Iraq) from 3 days to an average of 13 hours (see Tables 4 and 5).
- Jordan Customs has facilitated maximum transit trade without sacrificing security, hence has contributed to supply chain security and facilitation.
- A survey distributed to truck drivers and traders identified that both drivers and traders prefer to use the electronic tracking system and pay the cost of this service rather than return to the traditional escort system. The use of the tracking system is optional for traders and drivers, however, to cover running costs, Jordan Customs has imposed a $30 service fee on trucks which use the system.
- It has been noticed during the last year that the number of smuggling cases by transit trade reduced significantly, and as well, the number of organised smuggling within customs centres has increased, which indicate that the tracking system deters the smuggler from handling the smuggled goods during the transit trip, the goods have to reach the customs centre (border or internal) and the smugglers need to try to handle their smuggled goods by organised means inside the customs centre.

Table 4: Transit trip duration from Syrian border (Jaber) to Saudi border (Umary)

GPS Unit No.	Trip duration(hrs)	Truck plate No.
8745	3:14	1
9696	2:48	2
8999	4:39	3
3799	3:17	4
9705	2:47	5
3780	4:08	6
9465	2:46	7
9813	3:48	8
3272	3:37	9
9437	4:02	10
9502	2:55	11
8695	3:11	12
9647	3:45	13
9739	3:08	14
3155	3:39	15
3617	4:11	16
3107	3:13	17
3460	3:20	18
3598	3:54	19
9378	2:54	20
Average Trip duration 3:27 hours		

Table 5: Transit trip duration from Aqaba Port to Iraqi border (Karameh)

GPS Unit No.	Trip duration (hrs)	Car S. No.
9333	10:32	1
3677	13:43	2
3533	11:29	3
3962	13:46	4
3397	12:06	5
3668	11:54	6
3870	12:55	7
9732	14:08	8
9762	10:46	9
9823	10:34	10
9440	12:39	11
9339	13:19	12
3327	14:59	13
9458	13:46	14
8902	14:19	15
9716	14:52	16
3227	12:49	17
8692	14:28	18
3853	11:56	19
8566	13:45	20
Average Trip Duration 12:56 hours		

8. Recommendations

The Jordan Customs electronic transit monitoring and facilitation system is a pioneer model and to date, a very successful replacement for the escort system. It has proven it can increase supply chain security, reduce costs and facilitate the movement of goods across borders.

However, the following important aspects must be handled carefully:

- As some of the customs centres terminate transit trips more than initiated trips, extra tracking units and electronic seals at these centres must be transferred to other customs centres that initiate more trips than are terminated. Handling the extra units and transferring them between customs centres need to be well planned and at accurate time intervals to avoid any shortage of tracking units at high traffic centres.
- The patrol cars that investigate the violations committed by the transit trucks must be distributed along the transit route to ensure that any truck can be reached in less than 30 minutes.

9. Future developments

X-Ray integration

The system will be connected to the x-ray cargo scanners at each border crossing. The x-ray images of the scanned trucks will be attached to the trip report. The trucks that commit violations during the journey will be scanned again at the exit border and the images will be compared before allowing the trucks to leave the country.

Risk analysis integration

A risk analysis system will be developed and integrated with the tracking system to provide assessment of the risk level posed by drivers during a transit journey. This analysis will be based on a driver's antecedents, the type of goods being carried, previous violation details, type of goods being carried, origin of the goods, etc. The assessment will be used to assist customs patrols in responding to threats.

References

Jordan Customs 2004, Pilot project report for transit monitoring system.

Jordan Customs, Directorate of Risk Analysis, Documentation of risk analysis system.

Jordan Customs, Directorate of Telecommunication and Control 2006, Electronic tracking system, RFP Document.

Jordan Customs, Minutes of meetings of transit and escorting steering committee (2006 to 2008).

Jordan Customs, Directorate of Telecommunication and Control 2009-2010, Statistical reports issued by electronic tracking system.

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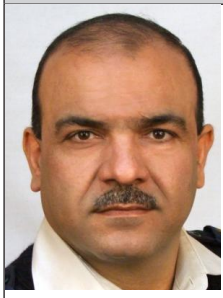

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