Opportunity of RFID using for intermodal transport in security of goods

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Abstract. Intermodal transport is a topical and important problem in Europe. Although huge of goods is transported by road, there is increased demand for freight transport. A combination of transport modes using universal containers is one of the solutions proposed: this is known as intermodal transport. The paper deals with the importance of radio frequency identification (RFID) technology for the development of intermodal transport and it answers some of the crucial questions regarding its application. Also paper is focused on goods security and how the RFID technology could prevent some of the risks.

Introduction

The economic development of Slovakia is to a great extent influenced by global economic situation. Slovakia is a part of Euro area, so the state currency is Euro. Economics is oriented to export. The balance is app. 0.5 mil. € for the benefit of export. Most important partners of Slovak economy are Germany, Czech Republic, Russian Federation, Hungary, Poland and Austria. Slovak GDP registered a total increase between 1998 and 2009, but in the year 2009 significantly decrease. Although now (2010-2014) GDP increases again, growth is not as high as before 2009. Present GDP is more then 72 000 mil. €. A big threat for Slovakia is the share of the budget deficit of the GDP. The roots of those deficits are usually in Economic crisis, because we can observe large rates of growth in the past years.

The most important transport flows are in direction East – West. Large volumes of goods are transported from North Germanic Sea ports to terminals in Czech Republic, Slovakia and Hungary. Lack of flows exists to Romania. There is a chance for development of that corridor as well as for cross delivery of goods to Central Europe from Black Sea ports. Higher accessibility of the Eastern parts of EU will establish new economic occasions which will be pretentious to transport and logistics services. Better transport connections will attract investors, customers and new job opportunities.

Characteristic of the freight transport

The biggest logistics operators in Slovakia are as follow:
✓ Eustream, a.s., Bratislava,
✓ Železnice SR, Bratislava,
✓ Železničná spoločnosť Cargo Slovakia, a.s., Bratislava,
✓ Slovenská pošta, a.s., Banská Bystrica,
✓ Express Slovakia "Medzinárodná preprava", a.s., Bratislava,
✓ Budamar Logistics, a.s., Bratislava.

Road freight transport is dominating in Slovakia up to this time. Around 46% logistic operators use road transport. Main reasons are its flexibility, decreased ability of state-owned rail companies to compete in the new economic conditions, and also thanks to unequal pricing for the use of
transport infrastructure, which was for a long time more advantageous for road than rail transport. So because of all these reasons second most used is rail transport – 38%. And last is water –8% and air transport – 8%.

The market share of rail freight transport is oscillating at about 20% of the total freight transport market. According to railway infrastructure is insufficiently used, much extended, and obsolete (with gradually degrading parameters (speeds, axle loads), not accommodated to modern European rolling stocks (problem with electromagnetic compatibility), and thus limiting modernization of rolling stocks of operators. Investments are concentrated only on corridor projects with resignation of infrastructure manager to modernize others. State-owned rail companies proved to show low effort to optimize from inside. All three state-owned railway companies are running revitalization programmes, and do not have finances for large investments.

**Intermodal transport - conditions**

Slovak transport and logistics market was focused on transportation to and from the east before 1989. Mainly on transport of iron ore from the Soviet Union, and shipments of steel back. These shipments were conducted exclusively by rail. When Slovak market was opening of the Western market after 1989 this was related to the development especially of road transport. Intermodal transport is determined by great boom in the last ten years. The important parts of intermodal transport development are intermodal terminals that should be carefully planned in each country to cover all its industrial and urban territories and thus enable efficient and sustainable transport.

Intermodal terminals are mainly along the Danube waterway. Use the transhipment of goods between the inland waterway transport, road and rail transport. Another major terminal is in the Čierna nad Tisou. It focuses mainly on the transhipment of goods on the railway between normal and wide-track decision. Here moves goods between EU, Russia and other countries in the East.

Legislative conditions on Slovak transport market are not fully harmonized with EU laws, pricing for use transport infrastructure is not split equally on all users.

Railway network requires heavy modernization; government prefers building of road highways. Pricing for use transport infrastructure is not split equally on all users.

Nowadays, a total of eight intermodal terminals are operating in Slovakia, concretely port Bratislava Pálenisko (SPaP, a.s. Bratislava), Bratislava UNS (SKD Intrans, a.s.), Košice (SKD Intrans, a.s.), Žilina (SKD Intrans, a.s.), Dobrá (TransContainer Slovakia, a.s.), Dunajská Streda (Metrans (Danubia), a.s.), Košice – Veľká Ida (Metrans (Danubia), a.s.) and Sládkovičovo (Green Logistics Slovakia). All operating terminals are owned by private companies and partly opened for public.

The existing network of intermodal terminals in Slovak republic is technically and technologically obsolete, does not meet basic parameters defined by the AGTC, and the terminals are non-public, therefore they are unable to provide services required by the actual transport market.

**Opportunities for intermodal transport**

Long-term opportunities are identified such as new infrastructural project into railway and inland waterway infrastructure; finishing full network of motorways and expressways; finishing full intended network of public intermodal terminals; pricing for infrastructure use including all externalities, and applying tolls on personal transport. Each of these opportunities has also some critical points such as insufficient profitability and low available sources of investments (infrastructural projects), political risks (pricing changes) and technical problems (applying tolls on personal transport depends on the Galileo GNSS project).

Middle-term opportunities are identified mainly in the railways infrastructure modernization, which depends on measures to increase the profitability of infrastructure manager and obtaining larger financing support from European funds and Slovakian government. The main running and planned middle-term investments are performed into corridors IV (Dresden/Nuremberg - Prague - Vienna - Bratislava - Győr - Budapest - Arad - Bucharest - Constanța/Craiova - Sofia -
Thessaloniki/Plovdiv – Istanbul), V ((East-West) Venice - Trieste/Koper - Ljubljana - Maribor - Budapest - Uzhhorod - Lvov – Kiev) and VI ((North-South) Gdańsk - Katowice - Žilina, with a western branch Katowice-Brno), according to needs of European community. Modernization of rolling stocks is limited by infrastructure, and is running more slowly as it could. All these measures, if successful, will help to competitiveness of rails in comparison with roads. Some middle-term opportunities are also in planned government changes of toll system for road transport, but full details are not known up to this time.

Short term opportunities are closely related to revitalization programme of state-owned railway companies and to the activities of their management. Another problem is to clarify how security can make influence the competition between the modes or transport and how the differences can be get closer giving the same playing field. It is clear the security of goods is a very important category of risks in transportation. Altogether damage incidents and thefts are frequent when compare to the other categories and causing high economical damage in all of the countries. In Slovakia is also relevant some other categories as smuggling and import of counterfeit goods. Trafficking in persons is only relevant in a country if it has external, non-Schengen borders.

**Situation regarding security in the Slovak republic**

From Slovakia point of view the safety of railway cargo transport is very important. The security preferably is aimed at safety of transported goods in the area of the freight transport. Goods are permanently exposed to risk of theft or damage and on safety of transport of dangerous commodities risky for environment. But organized criminal groups are focused on thefts of transported goods and are mainly performed in places of train shunting or in places where cargo stops for longer time. Organized groups have own network of customers, traders, storages, they are well known of transport technology and cargo logistics. Largest amount of thefts of cargo was aimed at following commodities: gas products, automotive parts (spare parts), tyres, iron-scrap, parts from transported automobiles, iron casts and furniture. [1]

It can be stated, that most frequent are thefts, from which those made by organized criminal groups are most dangerous. Therefore, as most important for increase the safety of transported goods and decrease its thefts or damages. But, smuggling and import of counterfeit goods seems to be economically even more devastative for Slovak economy than thefts, because it is connected with tax and toll avoidances. Since Slovakia is a member of Schengen Agreement and takes responsibility for administration of Slovak-Ukrainian border, the most activity of Custom Administration of the Slovak Republic and other repressive organs in relation to smuggling, counterfeit imports, and trafficking is paid there. From two freight railway Slovak-Ukrainian cross-board points Maťovce – Pavlovo, Čierna nad Tisou – Čop, only Maťovce is equipped by roentgen scanner, which has already proved high success in detecting smuggled goods, mainly cigarettes and alcohol hidden is transported lose ground raw materials, or in wagons interiors. There are many reasonable suspicions, that after installation of scanner in Maťovce, the smuggling activity was transferred to the cross-board Čierna nad Tisou – Čop. [1]

Measures proposed for better prevention of risk categories, including terrorist attack, which has never happened against Slovakia up to this time and its probability is considered as low, are as shown in Table 1.

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Preventing Measures</th>
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<tr>
<td></td>
<td>Technical</td>
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<tr>
<td>Damage</td>
<td>- Modernization of wagon depot</td>
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<tr>
<td>Activity</td>
<td>Description</td>
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<td><strong>Installation of individual devices with the application of RFID technology, which would be placed on the chassis wagon</strong></td>
<td>- Installation of the signalization of unauthorized break-in into shipment in selected kinds of freight transport wagons (moving part) - On operational regional centers install stationary hardware (receiver and transmitter) and software (digital map + database) - Implementation of RFID</td>
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<td><strong>Continuous maintenance and improvement of System of Safety Management</strong></td>
<td>- Continuous drill of setting dogs - To improve stabilization conditions of setting dogs - To improve cooperation between Custom Administration of the Slovak Republic and Tax Directorate of the Slovak Republic</td>
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<td><strong>Dangerous Goods by Rail (RID) and RFID</strong></td>
<td>- A common European standards, which avoid costly inconsistencies and inefficient labeling of wagons RFID chips - More efficient exploitation of European co-operation and information flows under Europol, Eurojust and CCWG</td>
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<td><strong>Theft</strong></td>
<td>- To perform continuous drill of setting dogs - To improve stabiling conditions of setting dogs - To improve cooperation between Custom Administration of the Slovak Republic and Tax Directorate of the Slovak Republic</td>
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<td><strong>Smuggling</strong></td>
<td>- To build permanent scanning system of railway wagons in cross-border point Čierna nad Tisou - To fit up the Custom Administration of the Slovak Republic with second mobile scanning device, mainly determined on TKD Dobrá - Implementation of RFID</td>
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<td><strong>Import of counterfeit goods</strong></td>
<td>- Permanently on-line accessible and updated database TARIC-SK, performing its integration with legislation EU - Continuous building of APV ERP system, evaluating index of risk of declarant - Continuous transition to fully electronic import/export documentation</td>
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<tr>
<td><strong>Dangerous Goods by Rail (RID) and RFID</strong></td>
<td>- To increase the frequency of police and inspection roundups in the areas suspicious of dealing counterfeit goods such as opened marketplaces, storage houses, warehouses, etc. - Continuous transition to fully electronic import/export documentation</td>
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<tr>
<td><strong>Import of counterfeit goods</strong></td>
<td>- Implementation of TRIPS agreement - Reappraisal of penalties for importing and dealing counterfeit goods - Anticorruption measures inside Custom Administration of the Slovak Republic</td>
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<td>Trafficking in persons</td>
<td>- Strengthening technological and personal equipments on Slovak-Ukrainian border</td>
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<td>- Strengthening of personal and technical equipment of National Unit against Illegal Migration</td>
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<tr>
<td>Terrorist attacks</td>
<td>- Strengthening technical and economical background of Slovak Information Service, SIS</td>
</tr>
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<td></td>
<td>- To improve stabling conditions of setting dogs</td>
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As Table 1 shows, some of the risk category could be solved by implementation of RFID. Containers could be identified over long distances and in demanding environments such as intermodal terminals or port area thanks to RFID. Another advantage is real-time identification and tracking of containers, reaching new levels of traceability and control. The ability to automatically collect real-time data without burdening employees brings many savings [2].

It is clear that the RFID technology application especially on railways is important tool how to improve the quality of transport services. The benefits of integration of RFID are for all involved partners – for carriers, customer but also railway companies [3]. To the main benefits belong:

- Timely information among all involved partners and government offices,
- Optimize logistics processes from container point of view,
- Track the location of pallets and containers within the warehouse,
- Higher supply chain efficiency,
- Costs reduction,
- Reduce time for check-in and check-out when containers and pallets enter and leave the warehouse
- Facilitation of the flow of accurate information,
- Deter theft, diversion and counterfeiting,
- Management and security are notifying when unscheduled movements occur,
- Higher traceability and bigger efficiency of individual container,
- Reducing of face to face intervention what eliminate opportunities for corrupt practices.

RFID as modern technology would significantly change the capabilities of any company to acquire a vast array of data about the properties and location of any entity that can be physically tagged and wirelessly scanned within certain technical limitations.

RFID tags are automatically tracked as they move in and out of distribution and receiving centres, warehouses, airports, rail yards, ports and shipping environments. RFID easily deployed readers and antennas, located at key entry and exit points and other critical locations, provide instant visibility to assets leaving and entering the premise, as well as identifying where the assets are located at any given time. This is very important characteristic which could prevent especially theft and smuggling.
Conclusion

The article shows some of the issue associated with security of goods during the freight transport. RFID technology appears as one of the converging technologies. Many of the advantages that RFID system possesses are transferable to freight transport. Experts expect the RFID system will help reduce smuggling activities and paper work related to cargo movement across the border. It is a very powerful medium for identification of any object. RFID is now key technology in the field of asset tracking.

On the other hand high input costs and the lack of a European standard for international deployment in Europe is significant obstacle in the current mass implementation of RFID technology. The viability of proposal would also depend if governments make the use of the RFID system mandatory for movement of containerized cargos.

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