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Market research analysis

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Abstract. The ITS market is changing rapidly shaping the near future of a brand new world. This paper aims to provide an understanding of this ever-changing world, analysing current markets, trends and initiatives which will eventually contribute in developing new business models and incentives in order to accelerate the ITS deployment in Europe.

The paper provides a general ITS market watch including an overview of the market and it identifies the current needs and trends of ITS solutions. In addition to this, the research is based on four case studies both in terms of market analysis and stakeholders' analysis

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Keywords: Intelligent Transport Systems, Market Research.

1 Introduction

According to the EC ITS can play a significant role in delivering safe, efficient, sustainable and seamless transport of goods and people in Europe as well as to safeguard the competitiveness of European industry. [1] The Innovation Union flagship initiative [2] and Digital Agenda for Europe [3] underline the need for a strategic approach to innovation where innovative technologies need to be deployed quickly to maintain the European transport industry at the forefront of international competitiveness whilst preserving jobs in Europe and supporting economic growth.

A prerequisite for effective deployment is a better understanding of the market conditions surrounding the ITS arena. [4] This paper provides a definition and assessment of the current ITS market environment based on four *ITS case studies*.

A vast range of ITS definitions currently exist [45], [5], [6],[7], [8], however, for the purposes of this paper, we adopted the definition applied at the ITS Handbook [9] *ITS - Intelligent Transport Systems - is a generic term for the integrated application of communications, control and information processing technologies to the transportation system*

The selection and configuration of the case studies has taken into consideration several key factors such as the technology employed, market segmentation, market viability, transferability, innovation level and involvement of a network of stakeholders.

The four case studies consist of:

- Case study 1 is a carpooling service deployed in the campus of the Universitat Autònoma de Barcelona. .
- Case study 2 is a traffic light infrastructure integrated in the Urban Traffic Control and an Energy Efficient Intersection Service (EEIS) deployed in the Municipality of Verona.
- Case study 3 is a synchromodal track-and-trace solution including a forecasting of container arrival service located in the corridor Rotterdam-Limburg.
- Case study 4 is a predictive maintenance solution deployed in the London North Western route from London to Carlisle.

2 Overview of the ITS market (status quo)

Grand View Research, Inc forecasts the global ITS Market will reach USD38.68 Billion by 2020. [10]In 2017, BIS Research provided a report stating that the global ITS market is estimated to reach \$72.32 billion in 2022 and will grow at a compound annual growth rate (CAGR) of 7.9% over the period 2017-2022. North America leads the global ITS market and Asia-Pacific (APAC) is expected to grow at the highest rate in comparison to other regions [11]

Despite the high growth of the ITS market, there are certain factors hindering faster advancements. One of them being the slow growth of intelligent infrastructure owing to high installation cost for monitoring and controlling devices.[12] Another key barrier restricting the global ITS operation is the lack of standardisation but also the relevant legislation and policies which have not so far been harmonised [13] There is an imperative need for governments to develop their strategic plans towards ITS including legislation and measures in a transparent manner in order to also rise the interest of private parties to invest in the sector [14]

Amongst the major trends, the introduction of smart vehicles are at rise, aims to respond to the demand for an increased public safety [15] However, while Connected and

autonomous cars are “hot topics”, according to the GSMA report (2015), mobile communications are crucial.[16] To this end, Mobile Network Operators (MNO) are in an advantageous position where they have an important role to play. However, due to the disruptive nature of the future ITS market, which will be a culmination of converged ICT and automotive industries, MNOs have to adjust their business model to be able to respond to the rapid needs of the advancements [17]

3 Methodology

The objective of this paper is to provide a description of the market conditions in order to enable the exploitation potential of ITS solutions. To better understand the significant market drivers in context, a case study approach was adapted. A holistic market-demand-supply intelligence process was applied which resulted into a value chain analysis

Two main phases of data collection and analysis were performed: a market research and a stakeholder analysis. The first phase included data collection based on secondary research. The objective of the first phase of the desk research was to collect information from different sources with on market definition, sizing; products analysis; competitors assessment; market segmentation and customers definition; market information, trends and barriers (considering technological, business, social, policy and organizational factors).

For the market analysis, the following tools were applied:

- Political, Economic, Social, Technological, Environmental, Legal analysis (PESTEL) on the ITS sector on the whole but also on Case Study level
- SWOT analysis, evaluating the strengths, weaknesses, opportunities and threats of the case studies
- An overview of the current and potential market
- Competitors' assessment

The second phase of the market study involved a stakeholder analysis. In this, qualitative information was collected, making use of stakeholder structured interviews, in order to determine influences and interests. More specifically, the stakeholder analysis included the following steps:

- Identification of the case studies' main stakeholders and key characteristics
- Assessment of the stakeholders considering their importance and influences
- Mapping and characterizing relations and dependences between stakeholders
- Value Chain analysis

4 Results

4.1 Case study 1(CS1): University VaoPoint Mobility

Car-sharing market potential has increased recently as a result of expansive sharing economy [18]. For the specific case study, the demand curve is elastic and flexible – students, admin and academic staff work with different work schedules – which could allow a high degree of utilisation of the carpooling services. The supply curve, however, for parking seats is inelastic and totally vertical, fixed at a specific size

With regards to the macro environmental analysis of CS1, the technological developments seem to be in a good stage of development to support the solution while social acceptance is gaining ground. Opportunities to expand to other markets is very significant, however, incentives must be offered to achieve high occupancy of the scheme.

For the implementation of the project, a range of stakeholders were involved. However, the primary stakeholders in order of importance and influence are UAB MU (transport authority within the university campus), Aslogic (ITS service provider), and UAB (academia). They can be considered the project initiators as they can influence positively the rest of the stakeholders.

Finally, from a value chain analysis perspective, it can be concluded that the main costs for the primary activities are located in the operations. The bigger the demand, the more computational power the platform will require. The inbound logistics and the outbound logistics parts (data gathering and service delivery) are web based and usually operated by the end-users from their smartphones, so there are not big costs involved.

4.2 Case study 2 (CS2): Traffic Management System in Verona

The current market demand for EEIS is significant. The global traffic lights market is deemed to grow steadily during the period 2017-2021 at a Compound Annual Growth Rate (CAGR) of about 6% [19]

The demand side of the project involves two major groups, the first group being road transport operators and drivers and the second group added value (supplied by third parties services users). The supply side is composed by traffic control systems manufacturers and ICT service providers along with the municipalities. Both demand and supply are growing very slow, with demand being totally ‘inelastic’ since the solution is offered free of charge. Provision of add-on fee-based services would cause the supply demand equilibrium to balance at a different point depending on the services provided and associated costs.

From a macro-environmental perspective, the political problems in multi-stakeholder involvement might be one of the most important barriers. However, there is potential for expansion of the service beyond city or country borders as the challenges (pollution, safety etc) that the application addresses, are common to many cities.

The stakeholder analysis revealed that the Municipality of Verona, Swarco Mizar (ITS service provider), AUDI (automotive supplier) and Telecom Italia (ICT service provider) were considered to be of utmost importance as providers of essential hardware and know-how for the realization of the project itself.

The conclusions of the value chain are that a big part of the costs for the primary activities are in the acquisition and deployment of the infrastructures needed in order to provide the services, which could be located in the inbound logistic operations. These costs are also proportional of the size of the place where allocated, since they will require more infrastructure the bigger (or complex) the place is.

4.3 Case study 3 (CS3): synchro-modal corridor

According to recent studies the global freight management market has great potential 20 21. The Netherlands holds a strong position in terms of logistics; this is reflected by the position of Rotterdam as the largest seaport in Europe. The container throughput in Rotterdam amounted 12.4 million TEU in 2016 and is forecasted at 18 million TEU in 2035 22 [20] [21][22]

Currently, in the pilot phase of CS, , the services are provided for free, the supply to be inelastic, The demand on the other side, is elastic based in the amount of the size managed by the actors in the demand side (shippers, inland terminals and warehouse operators)

CS3 offers a sustainable transport solution which of course it is influenced political, economic, environmental and social elements. Another element that is affected by external factors is the use of an open source data model by CS3 that allows better combining of various data flows from several stakeholders. This ICT solution is influenced by several external factors including technical and legal issues with data security and privacy.

TNO (research institute) is coordinating the development of the technology, therefore TNO is of high importance and high influence. The shipper, ITO and Warehouse L are the main users of the service in the pilot phase. The planning data and knowledge on the requirement of the system are key for the service development, which makes them stakeholders with high importance.

Finally, the value chain analysis demonstrated that the major cost for the primary activities are located in the operations. The more customers of the solutions, the more computational power the platform will require and the more software & hardware infrastructure (servers, cloud services) will be needed. There is a big opportunity of creating added value in the outbound logistic, offering personalised services to the customers depending on their specific necessities.

4.4 Case Study 4 (CS4): Keep Safe

According to UNIFE WRMS the world rail market volume hit a record level of nearly €160 billion in 2015 and in the coming years the market volume will grow 2.6 percent per year on average worldwide and reach €185 billion in 2021.[23]

The demand of Keep Safe is elastic based on the contract of the franchise with Network Rail for the routes where the franchise is operating and the total variable usage charge, which will constitute variable maintenance expenditures for the franchise. In the current model for Virgin, the predictive maintenance services are provided for free, causing the demand to be inelastic.

According to the SWOT and PESTEL analysis, this case study has extremely important and innovative technological components, a crucial social aspect, a potentially high economic benefit for a relatively low cost, some interesting political implications, and potentially important benefits in the long term future for the legal and environmental aspects.

With regards to the stakeholders involved for the implementation of this project, the three key stakeholders of this case study in terms of both influence and importance are Network Rail (owners of the trains and the infrastructure being monitored), Virgin Trains (trains operators) and Coventry University as the custodians and analysts of the infrastructure data. Other stakeholders (Alstom Transport and Serco) played a key role during early stages of the project in the fitting and calibration of the sensors.

In the value chain analysis of Keep Safe, it is foreseen that the major cost for the primary activities are located in the operations. The sensors, cameras and infrastructure are not really a high costs overall compared with the potential savings the solution offers. The inbound and outbound logistics does not seem to be or experiment a raise in the costs actually. Marketing can highly benefit of the intervention of Network Rail promoting the solution to other operators. This could be reinforced with a travelers advertising campaign in order to further raise the social aspects of the solution.

5 Conclusions

The ITS market is changing rapidly and it's affected by several inherent factors along with other external factors in close relation with the ITS landscape. Topics like urbanisation, energy and a digital single market are changing the parameters of our surroundings and are shaping the near future into a brand new world.

The European Union is taking several initiatives in order to tackle the rapid evolution of the general mobility and transport situation (Transport White Paper, Urban Mobility Package, EU smart cities initiatives, strategy for a Digital Single Market, among others)

and developing new regulations and action plans for the specific deployment of Intelligent Transport Systems in Europe.

This paper aimed at providing an understanding of this ever-changing world, analysing the current markets, trends and initiatives adopting a case study based methodology

The case studies of this paper have been carefully selected as representative of the ITS ecosystem, covering several transport modes (road, maritime and rail transport) and all the market segments. As result of the market analysis, the factors influencing each case study have been identified along with the segmented definition of the market (supply and demand) and the selection of the target market and main competition.

The stakeholders' analysis provides information about their characteristics, influence and importance. The value chain analysis offers insights about primary activities and support activities

The results of this research can be used as a good baseline providing insights of how the ITS market is evolving and as a reference for other initiatives or policy makers in the development of ITS strategies.

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