

Application of GPS Vehicle Tracking Technology in Sri Lankan Supply Chains

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1. Introduction

Supply chains at present can make use of a multitude of applications of GPS (Global Positioning System) vehicle tracking technology to enhance performance, particularly in fleet operations. These extend across a wide range of applications from basic features such as geo-fencing and the monitoring of vehicle position, speed and distance, to more advanced features such as operations planning, vehicle and personnel scheduling, vehicle maintenance, and real time demand planning [1, 2, 3]. Although these applications are becoming progressively more widespread, mere utilisation does not guarantee the significant benefits it can generate.

2. Literature Review

Complexity of operations motivates adaptation of sophisticated technologies [4, 5]. Cost savings, service level improvements, enhanced control, safety and security also motivate the use of new technologies. However, such motivations are hindered by factors internal to the company as well as those external to it: the former including factors such as company being small, lack of expertise in technology, insufficient financial support, fear of change, organisation culture, inability to quantify benefits, difficulty in integrating with legacy systems, estimated long time durations for implementation, perception of risk of rapid obsolescence of technologies, difficulty in integrating with previously adopted systems, lack of management support, and inability to model the complex reality of transport processes; and the latter including external factors such as influence from other companies along the supply chain, hardware instability, and ineffective software [5, 1].

3. Methodology

The specific objectives of the present study are to identify the motives of adopting GPS vehicle tracking technology, to analyse the extent of its application, to identify barriers for enhanced utilisation of the technology in Sri Lanka, and to propose necessary adjustments that may be required to achieve the purpose.

The population for the study is defined as business entities that are using GPS vehicle tracking technology at present. The sample was confined to 34 respondents representing different product supply chains, entity types (manufacturing/ third party logistics [3PL]), and fleet sizes, due to time and other resource constraints. Primary data were collected through a questionnaire; tested for reliability using Cronbach's alpha, the coefficient for reliability; and analysed using descriptive statistics.

4. Data Analysis and Conclusions

According to the findings of the study, irrespective of whether a company is specialising in logistics operations, its fleet size, or the product transported, the detection of fraud is the primary motivation for adopting GPS vehicle tracking technology in Sri Lanka. It is followed by the motivation to improve safety. Although not applicable to the majority, improvements of operational responsiveness and specific customer requests to implement such a system have also become motivational factors to adopt GPS vehicle tracking technology. Surprisingly, the reduction of operating costs is rarely an objective of Sri Lankan companies adopting GPS vehicle tracking systems.

The objective of fraud detection is also the key objective to adopt GPS for large companies (operating fleet above 30) in Sri Lanka. In contrast, small companies (with a fleet of less than 10) are not much motivated to use GPS, unless their customers have specifically requested its use. For companies transporting apparel, vehicles or machinery; safety is the key motivation in adopting GPS vehicle tracking followed by operational responsiveness, which may be due to specific characteristics of the product such as high value and time sensitivity.

As opposed to the motives for adopting GPS technology, a majority of the companies has claimed to achieve improved responsiveness; followed by detecting fraud and improved safety after utilising the technology. Further, reduction of operating cost is achieved by only a minority, implying both lack of understanding of possible long term cost savings and the poor utilisation of advanced features available with the technology.

According to the mean value analysis, a majority of present GPS vehicle tracking users make use of its basic features for daily operations. These features include distance travelled per journey, vehicle position, direction and speed, vehicle tracking reports, alert on speed violation and route geo-fencing. Application of features such as engine on/off status, door open/closed status, and seat belt status remains low. In contrast, application of advanced GPS vehicle tracking features is low among present users. Out of the thirteen features tested, only operational

planning and KPI monitoring (such as on time arrival/departure) were used by a majority (58.8%). Features such as vehicle and personnel scheduling, truck turn-around time (TTT) monitoring, fuel usage/efficiency monitoring, cargo conditions monitoring, security camera, two way voice communication, and integration with other business applications, are rarely used.

Among the major barriers for enhanced GPS vehicle tracking technology utilisation are lack of mechanisms in place to track and monitor performance and verify progress, and lack of knowledge on possible applications and benefits of the technology. Lack of system features is also a barrier as per the view of some present users. Although GPS signal blockage can happen typically because of overhead obstructions such as tunnels, bridges, and trees [1, 2] interrupting the operations management, it was not highlighted by the users. Lack of knowledge is significant in companies operating small fleets (less than 10 vehicles), while lack of performance measurement is significant in companies operating large fleets (greater than 30 vehicles). Due to the lack of knowledge prevailing among companies operating small fleets, the cost of investment will not be justifiable given the benefits gained, leading to a lack of motivation to use GPS, unless the customer specifically requests it. Thus, such companies can start off with strategies such as consolidated purchase of hardware at a discounted price through mutual association to reduce investment costs.

The analysis proved that a majority of the users in Sri Lanka has experienced improvements after adopting GPS vehicle tracking, although the application is limited to basic features. On one hand, this may also hinder exploitation of the technology to its optimum potential due to premature satisfaction. But the analysis also revealed the high possibility of improving supply chain performance in Sri Lanka through enhanced utilisation of the technology. Implementation of an appropriate mechanism to track and monitor performance and to identify improvements is the best solution to encourage the application of GPS vehicle tracking technology, followed by negotiation of service level agreements with GPS vehicle tracking technology service providers. Investing in an OCC (Operations Control Centre) with proper infrastructure is also suitable for companies with fleets larger than 30 vehicles.

5. Conclusions

The research findings stress upon the prevailing lack of knowledge and understanding of the subject among present users, and demonstrate the capacity available for them to improve supply chain performance by optimum adoption of the technology. Findings suggest that present and future GPS vehicle tracking users must continuously explore the possible applications of the technology innovatively

to obtain a competitive edge. Operational staff, in particular, must be well educated on the subject, which would enable them to think and experiment with creative applications/features using the technology. Also it is a critical need to establish a mechanism to monitor performance, especially in large companies. Conducting training programmes or hiring multi-skilled professionals in the field are proposed to obtain expertise. Most importantly, users and service providers could mutually benefit by developing collaborative relationships creating an environment for sharing knowledge and expertise.

References

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