

The Effectiveness of Global Positioning System in Tracking Services for Sustainable Road Haulage Operations

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Abstract— In today's highly competitive marketplace, businesses must innovate new ways to streamline their business and optimize productivity. With the aid of modern transport technology applications, it can create better visibility within the operation, which will enable more control over the business and stay ahead of the competition. Based on this scenario, the measurement of the effectiveness of tracking services by using the Global Positioning System (GPS) in improving the logistics of transporting goods was developed. Two indicators involved in this study, which are delivery time and fuel consumption. In gathering the data, researchers were conducting observation, monitoring and also a structured interview in Company XYZ focusing on the transport department. The highlights of the analysis are to evaluate the improvement of the delivery time and fuel consumption after implementing the GPS. This analysis has been carried out by assessing the trucking planning and managerial issues encountered by Company XYZ that already implement the GPS as a tracking method since the year 2016. This study is one of the information platforms for the logistics and transportation industry to grow and propel the country into a high-income economy based on the 11th Malaysia Plan.

Keywords— *GPS, Optimization, Road Haulage, Surveillance Technology, Sustainable*

1. Introduction

In recent years, the technology revolution had reached all industries and sectors as follows the requirements of global modernization. According to Ref. [1], many companies have to implement advanced technologies such as Global Positioning System (GPS) and other wireless technologies in their logistics and transport services. Previously, to keep track of business trucking operations, managers have depended on traditional manual systems such as driver log sheets, service forms

and other papers of recordkeeping. In every case, a logistics manager is required to deal with frequently inadequate sheets of paper to reconstruct vehicle records although much of this process has been automated. On the contrary, GPS technology can be utilized to improve the transportation process as it is designed to track and records the trips comprehensively.

GPS tracking uses elements of real-time and location to provide data points for the company which it received from the satellite navigation system in the airspace. The application of GPS tracking normally used to track vehicles to reduce idle times, improve routing operations and provide better customer service. Hence, the company also knows where the employees and the truck located and better prepared to deal with emergencies. Furthermore, by using GPS tracking can give better controls over fuel spend during the shipment door to door services.

Therefore, as the heart of the supply chain industry in Malaysia, the road haulage sector has no way behind implementing this technology in its operation to offer greater quality of services towards their customers. With the implementation of effective technology like GPS, it will create better visibility within the transport operation, which will enable to have more control over their business and stay ahead of the competition.

Besides that, in managing transport operation to be more efficient, the collaborative activity was needed and is depends on sharing and exchanging information. Therefore, the transportation system needs a simple and compelling approach to deal with their drivers and register clients who are utilizing their transportation services. Apart from that, a transport planner officer and drivers need an effective way to have information on the shortest routes to the destinations and manage the requests from the clients. Transport planners also need to

keep in touch with driver movements without waiting too early or lead too much delay.

Providing the previously mentioned services collectively and handling them from many locations is tremendously difficult for the transport company. The ability to trace and manage the movement of the vehicle every 2 minutes might translate into monetary value as regards an organization's primary concern. Essential costs, such as fuel and employee overtime, may be closely checked and monitored to ensure the firm is operating at optimum potency. For instance, excessive vehicle idleness not solely uses fuel but additionally causes excess engine wear and tear. By using real-time tracking and assessing the proper reports, fuel consumption might rapidly reduce up to 20%. The utilization of technology is becoming more crucial in logistics, as it may enhance logistics performance [2].

Based on this scenario, researchers want to investigate the effectiveness of tracking services by using GPS at XYZ Company since the company was implementing this technology in June 2016. As a logistics service provider, the company offers various services for its customers, which are freight forwarder including air and sea, customs brokerage, warehousing, trucking and distribution, packing and removal, ship management, material handling, and logistics consultancy. Therefore, based on the range of services, the researchers are more interest and focus on the operation department which is under logistics regarding tracking services.

2. Discussion on Previous Studies

The fleet tracking system such as Global Positioning System (GPS) can effectively be utilized in a broad range of industries, yet one of the most obvious is the transportation industry. This industry can experience benefits from almost every feature of GPS fleet tracking. Based on [3] report, GPS vehicle tracking can make a serious difference when it comes to the business or the company whether monitoring the employees are keeping track of truck or fleet. Additionally, GPS has the potential to reduce the time it takes for the truck to get from one place to another. GPS is a radio navigation system that uses information from satellites to calculate the position of an object on Earth. It is an essential management component of the supply chain because of its ability to locate a truck or vehicle [4].

This was also supported by the study conducted by [5], GPS technology has greatly improved the overall operation of trucking companies. This innovation provides multiple benefits to trucking businesses, including faster and more efficient

transportation processes, greater security of transport, and better time management. As a result, many trucking companies have taken great steps to introduce this technology into their businesses.

Besides that, GPS has the potential to reduce the time it takes for the truck to get from one place to another. That time adds up and squeeze in more appropriate in a single day, or make more delivery trips in a shorter period. As a result, speedy and efficient service will keep the existing and current customers satisfied with the services and they will be more likely to recommend using the company services. Accordingly, Ref. [6] indicated many companies using Information Technology on their trucking services because the majority of them have issues with delivery time, which takes about two hours to deliver goods or services to the customer. This issue also arises in XYZ Company that related to delay in their delivery time. Besides, drivers also start their job very late and this becomes one of the reasons the goods cannot deliver on time.

In other that, the fluctuation price of fuel also plays a major consent to the company especially for small and medium companies. They need to allocate more budget for fuel expenses when the price rise unexpectedly. Therefore, fleet tracking can help to reduce the fuel consumption, such as reducing the truck speed and decreasing the idle time during the shipment because the GPS tracking will send an alarm or notification to the coordinator, thus the coordinator will communicate with the driver [7]. Issue related to fuel consumption in XYZ Company is the driver is not being honest in which they report to the managerial levels they refuel but the fact is not. Apart from that, they also do not turn off the air conditioner when stopped and causing the company to bear losses.

By using this GPS tracking, the coordinator will know exactly when employees start work, how long they take for lunches and breaks, and when they stop working for the day, without relying on manual timesheets. Besides that, this system is very accurate, verifiable timesheets will streamline payroll processes and help the company avoid paying excessive overtime pay due to timesheet falsification or unintentional errors [3].

Regarding the discussion on the related issues, the researchers have used two measurements in this study that consists of delivery time and fuel consumption that can affect the effectiveness of tracking services by using the GPS to improve productivity at XYZ Company since the company has installed GPS in June 2016. Also, by utilizing truck tracking, the company can gain complete

control over the fleet and significantly reduce costs for the company. The clear measurement stated in the conceptual framework below.

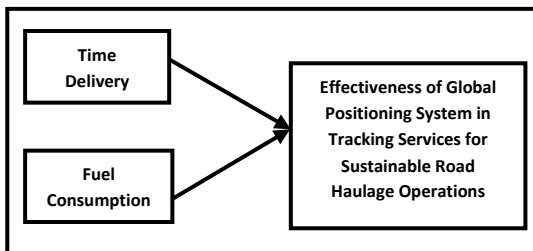


Figure 1. Conceptual Framework

3. Research Approach

In the initial stage, the board range of study was required to gain proper knowledge in the area of the road haulage industry. This includes identifying past and current trends, management issues, factors influence and contribution towards high demand for transportation. To get a good foundation of knowledge and understanding of this study, the researchers were reviewed previous literature, collected ideas, issues and articles related to road haulage operations. Therefore, this study was conducted by using several methods of data collection to get accurate and exact numbers of data.

The sample of this study has been narrow down in the operation and transportation department in XYZ Company because of these departments play a major role in allocating and managing the transportation activities. Researchers also took the opportunity to use primary data which is based on the observation and questionnaires. These questionnaires have generated information regarding management and driver’s perception. A second method that researchers used is based on secondary data which means this kind of data collection comes from the previous studies that have been conducted from other researchers and from several sources which there would be compared for several years back to get accurate results for this research. The researchers were reviewed truck freight performance measures that could be extracted from the data and that focused on travel times, speeds and also fuel consumption.

A comparison of the data from the previous years was analysis by using Statistical Package for the Social Sciences (SPSS) software. It was started with a descriptive analysis to generate a comparison between the years for time delivery and also fuel consumption before proceeding to analysis the management and driver’s perception regarding the effectiveness of the GPS.

4. Result and Discussion

The measurement from the operation staff and driver’s perception of GPS practices is very important because they already used this system for almost three years in XYZ Company. Based on the pie chart below, the perception of acceptance in implementing GPS shows 80% of drivers agreed that by implementing this system it reduces errors during shipment to the customer and provides an accurate location. Meanwhile, another 20% of drivers disagreed with this statement because they are not comfortable being watched by the supervisor or coordinator during delivery. Hence, it can conclude that most of the respondents under the logistic department agreed to the implementation of GPS tracking of trucking services.

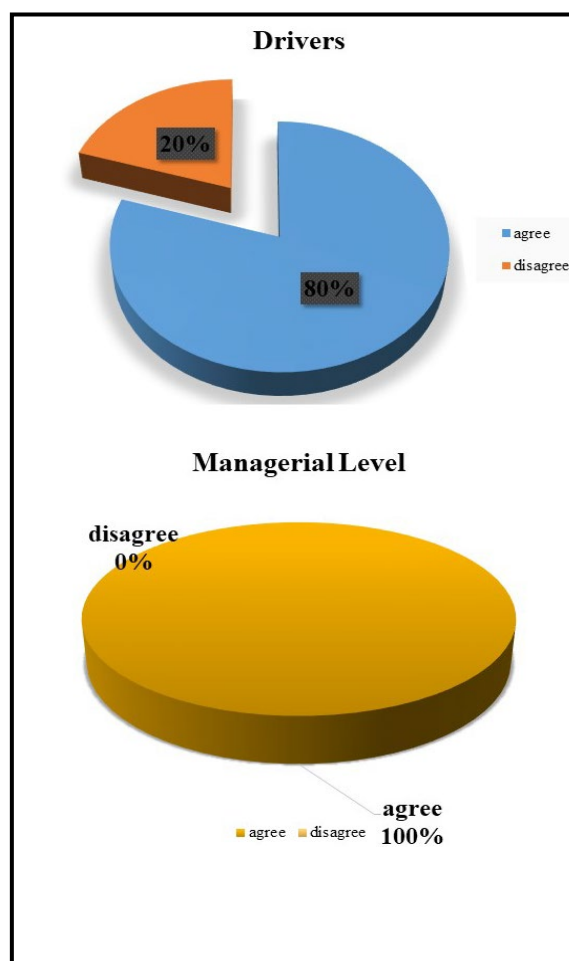


Figure 2. Perception from Drivers and Management About Tracking Services by Using GPS System

Apart from that, perception managerial level said that they are 100% agreed with the implementation of GPS for tracking services because by installing the GPS, it can increase the efficiency, effectiveness, and productivity of the company.

This was supported by [8] about GPS can improve better safety management decisions through enhancing service planning and results in increased productivity. Moreover, the successful implementation of IT support in numerous logistics activities is expected to bring several advantages to firms [9]. Meanwhile, [10], [11] and [12] also indicated that these advantages may extend from a reduction in errors in the section of information to upgrades in customer services. Similarly, [13] also highlighted the utilization of ICT could lead to higher customer satisfaction by enhancing firms service quality, thereby offering new chances to organizations. Since ICT influences the performance of an organization in multifaceted ways, this indicated that the organizations that can exploit the possibilities offered by ICT can deal with the sorts of innovative processes in their businesses.

Detail results were analyzed through the sortation of delivery time and fuel consumption data that was recorded in monthly. For delivery time, researchers have compared the data according to the truck, days and months.

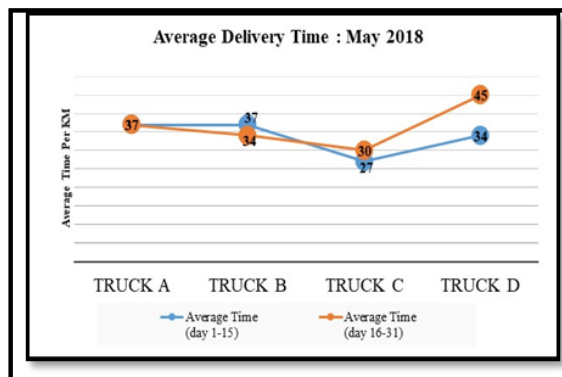
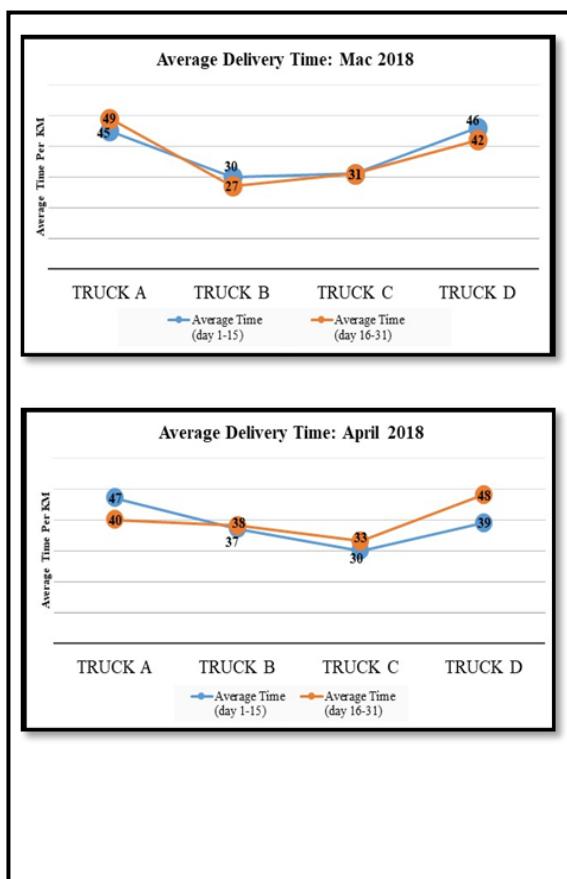


Figure 3: Average Delivery Time on March, April and May 2018

Based on the line graph above, implementing GPS tracking of tracking services at XYZ Company gives effect to the delivery time to the customer. The results showed an average range for time delivery after implementing this GPS for 4 trucks in 3 months is about 27 – 49 minutes, which is less than 1 hour. Based on this scenario, it was showed the improvement and efficiency in goods delivery, especially in time delivery.

Table 1. Summary of Average Time for 3 Months

	Average Time (Day 1 – 15)			Average Time (Day 16 – 30)		
	March	April	May	March	April	May
Truck A	45	47	37	49	40	37
Truck B	30	37	37	27	38	34
Truck C	31	30	27	31	33	30
Truck D	46	39	34	42	48	45



The normal practices and timely delivery for goods that used heavy goods vehicles normally the estimation time when the transport was requested or when it is expected to arrive at the destination will take about more than two hours without using GPS [14]. As mentioned by [15], the average time of tracking services take about 30 minutes to one hour, which results of effectiveness by using IT solution in many companies. Thus, researchers can conclude that this XYZ Company was achieved the efficiency in-term of time delivery by implementing the GPS in their company. Another measurement in this study is about the fuel

consumption, and the data has been taken in 2 years.

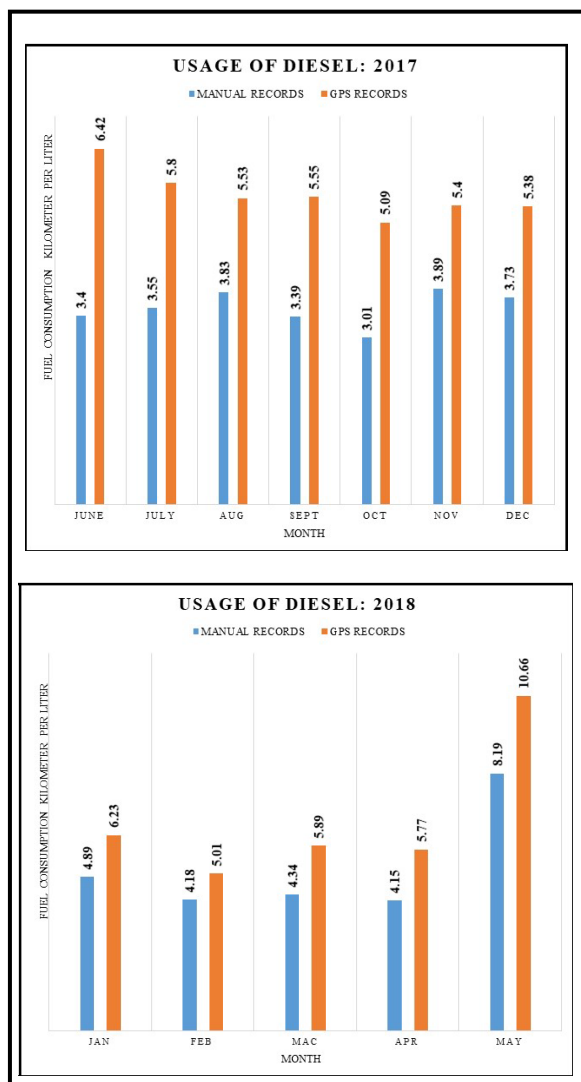


Figure 4. Fuel Consumption

As shown in the bar graph presents the usage of diesel trucks for the year 2017 and 2018 in XYZ Company that was recorded in 2 methods which are by manual recording and by GPS recording. Even though in the same month but the value of fuel that was recorded is different. The fuel consumption that was recorded by using the GPS was showed the high usage of fuel compared to manual recording. This means that there are miss-look or unrecorded data when they are using the manual method while recording fuel consumption. Based on this data, XYZ Company needs to fully implement GPS System in their operations and this will have solved their problem in-term of fuel cheating among the drivers. In other that, the estimation of fuel can be made for future usage and the company can allocate and plan their finances effectively.

5. Conclusion

This study was demonstrating the great improvement in XYZ Company operations especially for delivery time patterns and also efficiency for fuel consumption through the practicing of GPS. The implementation of new technology systems is a good interaction of numerous organizational factors, however obviously, these forms of solutions could be a source of competitive advantages which could boost up the quality of delivery services to the customers. By using GPS, transporters can distribute higher quality services with the ability to notify their customers with information regarding goods location while in transit. This assures customers of knowing about the progress of the delivery of their goods in real-time. The result is that the carriers are more reliable and trustworthy to clients. Transporters also become more aware and accountable during the distribution process concerning the safety and timely delivery of cargo. The GPS technology aids commercial trucking firms to track down the status of their fleet in real-time, including immediate reports of lost or stolen trucks, location tracking and the occurrence of accidents. Besides, this tracking software gives trucking businesses with advance technology by tracing their fleet vehicles in a real-time manner [16]. GPS can also act as a communication tool by providing real-time tracking to truck drivers and the dispatch team to improve the coordination process [17]. To avoid late deliveries, this technology helps dispatchers to pinpoint the best routes for a convenient trip. Additionally, the monitoring process would be much easier as the dispatchers can locate their movement of cargo fleet. Thus, the time of deliveries can be estimated accurately. Therefore, freight transport companies become more reliable in operating their businesses with the utilization of GPS technology.

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