Goods Tracking and Tracing System (GTSS) for SMEs in Malaysia

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ABSTRACT

The purpose of this paper is to propose goods tracking and tracing system (GTSS) for small and medium enterprises (SMEs) in Malaysia by using secured web based technology solution to streamline supply chain execution. The aims is to help small and medium enterprises (SMEs) in tracking and tracing their order and goods. The focus group of this system is to all SMEs that liaise with customers or partners and deliver their product directly to them. This paper presents a conceptual model of GTSS system for applying in SMEs warehouse and supply chain process. A literature review was conducted to explain the conceptual model such as how the system works, benefits and barriers and future of this system with focus on small and medium enterprises (SMEs) in Malaysia.

Keywords: Goods Tracking and Tracing, Small and Medium Enterprise

INTRODUCTION

The Small and Medium Enterprise (SME) act as a key drivers of the economic growth for several countries such as Malaysia. Some of the SMEs are capable to offer products and assemble goods at lower prices within the quality standard. Report of Malaysia Economic Census 2011 showed that there were 645,136 SMEs operating in Malaysia, representing 97.3 per cent of total business establishments (Norasikin Salikin, et al., 2014). Furthermore, SMEs employed about 3.7 million out of a total of 7.0 million workers amounting 52.7 per cent of total employment in the country (Norasikin Salikin et al., 2014). With a total share of gross output reached 28.5 per cent I year 2011 as compared to only 22.2 per cent in year 2000 it shows that the roles are getting significant (Norasikin Salikin et al., 2014).

Many studies show that SMEs are the driving engine of growth, job creation and competitiveness in domestic and global markets (Junaidah, 2007). To achieve their full

potential in these areas, SMEs in Malaysia need to catch up with new management and economic trends such as IT use, k-economy and e-commerce (Junaidah, 2007). To this end, The Malaysian government has embarked on a major push to persuade SMEs to adopt the Internet as a new and more efficient way of doing business and generating new business (Junaidah, 2007). Tracking and tracing system is one of the example of technology in supply chain that used Internet to track and trace goods from the supplier to the customers. There are various alternatives for designing the tracking and tracing (T&T) systems for such an inter-organizational environment (Mirzabeiki, V. et al., 2014).

A considerable amount of literature from previous research has been published on the tracking and tracing. On the other hand only few studies were focusing on the tracking and tracing issues, especially in developing countries like Malaysia although it has been known that, tracking and tracing (T&T) is a crucial part in supply chain process. Therefore, the aim of this paper is to explain and present a conceptual model of goods tracking and tracing system (GTSS), benefits and barriers also the future potential of this system to small and medium enterprise (SMEs) in Malaysia.

SMEs IN MALAYSIA

Based on Guideline for New SME Definition by SME Corp. Malaysia 2013 (Updated August 2016), the new definition of SME was simplified as below:

Table 1: New Definition of SMEs

Manufacturing: Sales turnover not exceeding **RM50 million** OR full-time employees not exceeding **200 workers**
Services and other sectors: Sales turnover not exceeding **RM20 million** OR full-time employees not exceeding **75 workers**

Table 2: Definition by Size of Operation

Category	Small	Medium
Manufacturing	Sales turnover from RM300,000 to less than RM15 million OR full-time employees from 5 to less than 75	Sales turnover from RM15 million to not exceeding RM50 million OR full-time employees from 75 to not exceeding 200
Service & other sectors	Sales turnover from RM300,000 to less than RM3 million OR full-time employees from 5 to less than 30	Sales turnover from RM3 million to not exceeding RM20 million OR full-time employees from 30 to not exceeding 75

Using benefits and incentives offered by Malaysian government, they have also taken steps to improve technology accumulation and to enhance the quality of their workforce through education, experience and skills development (Junaidah, 2007). To remain competitive at the global level, companies today must prepare themselves and their employees to function successfully in a knowledge-based economy (Junaidah, 2007). Information technology is an important tool in meeting that challenge (Junaidah, 2007). One of the technology that can be used by SMEs is tracking and tracing system for their goods in order to easily manage their supply chain.

TRACKING AND TRACING SYSTEM

According to Li, Z. et al. (2017), tracking and tracing service is the key for food producers, logistic providers and retailers to track and trace the flow of prepackaged food during its whole supply chain. The information will also open for consumers to trace the production and logistics process of the food they purchased (Li, Z. et al., 2017).

Through implementation of this service, manufacturers can track the processing processes of their products. If manufacturers receive the notifications about the defective prepackaged food, immediate measures could be made to minimize impact (Li, Z., et al., 2017). For distributors, they could identify the defective simultaneously and stop the circulation of these foods (Li, Z., et al., 2017).

The main objective of a tracking system is to find best-fit technology to minimize the effort to capture timely and accurate information on the movement of material (Mousavi, A. et al., 2002). Requirements for the development of a fully tracking and tracing system may be divided into hardware and software requirements (Mousavi, A. et al., 2002). The hardware requirements deal with the basic physical auxiliary devices, material handling equipment and plant layout design, whilst the software requirements tackle control algorithms, labelling and coding techniques, read/write capabilities, software hardware interface and systems integration.

There are two generic mechanisms can be identified, which both are a way to gather information in the sense of tracking and tracing (Zimmermann, R., et al., 2001). The differences between these two mechanisms are on the structure of the supply chain entities.

The first mechanism is a decentral one (Zimmermann, R., et al., 2001). Each entity's knowledge is limited to its predecessors and its successors. To track for instance an order in such a system, the inquirer asks his counterpart to whom he sent the order. From this point each entity checks first if it can supply the requested information and if not it refers the information to its predecessors. After the information is found it is forwarded until the original inquirer receives his requested information.The second mechanism is a central entity which has knowledge about all other entities (Zimmermann, R., et al., 2001). The inquirer always refers to this central entity when he requests information. This central entity uses its knowledge to generate a detailed plan to gather the necessary information while considering constraints (e.g. research costs or answering-time) at the same time.

Both of these mechanisms have their own weaknesses as for the first mechanism which gathers information step by step can lead to a very inefficient search for information, depending on the search mechanism and the structure of the supply chain while for the second mechanism is not appropriate to cover inter-enterprise relationships in a supply chain at all (Zimmermann, R., et al., 2001). Therefore to avoid these weaknesses the flexible system for tacking and tracing system need to be designed according to the organizational structure of the supply chain in the particular company.

GOODS TRACKING AND TRACING SYSTEM FOR SMEs

From viewpoint of tracking and tracing, supply chains can be regarded as integrative approach for dealing with planning and control of material from suppliers to end users (Dorp, 2002). In tracking and tracing for supply chain, it involves two parties which are suppliers to business customers and suppliers to end customers. Therefore both parties need to work together to determine the requirements needed in supply chain.

Goods Tracking and Tracing System for SMEs (GTSS) is a strategic tool to gain competitive advantage in managing supply chain process. It is a secured, web based

technology solution to streamline supply chain execution. These supply chain are visible to customers and company's supply chain entities. Generally this system uses web based to track and trace goods from the producer to intermediaries such as agents or distributors and also from the producer to end users. This system is targeted to small and medium enterprises (SMEs) so that they can benefit from this system especially in tracking and tracing their goods. Figure 1 shows a basic framework of GTSS system that is inspired and taken from Salampasis, M., et al. (2012).
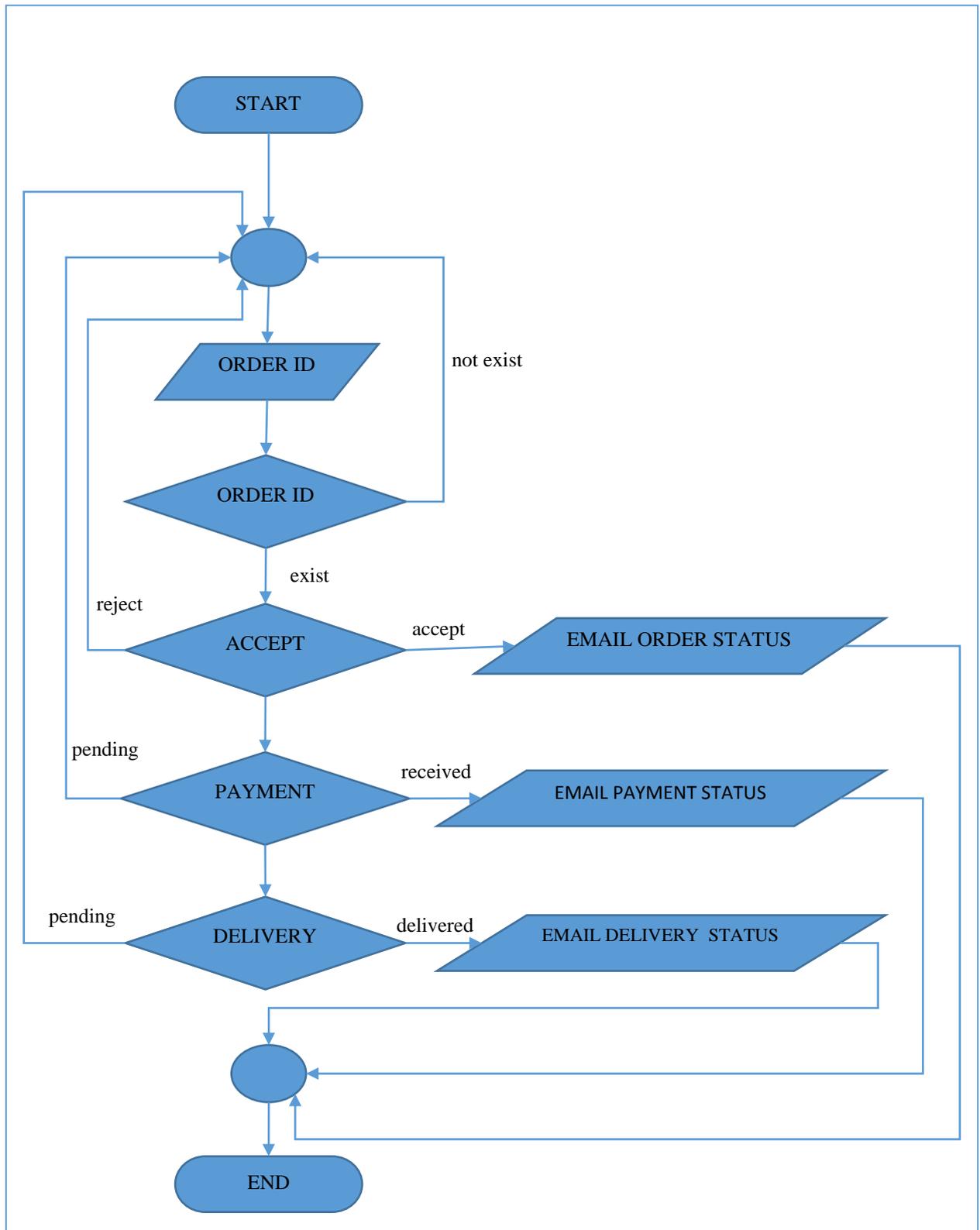
Figure 1: Tracking and Tracing In Supply Chain
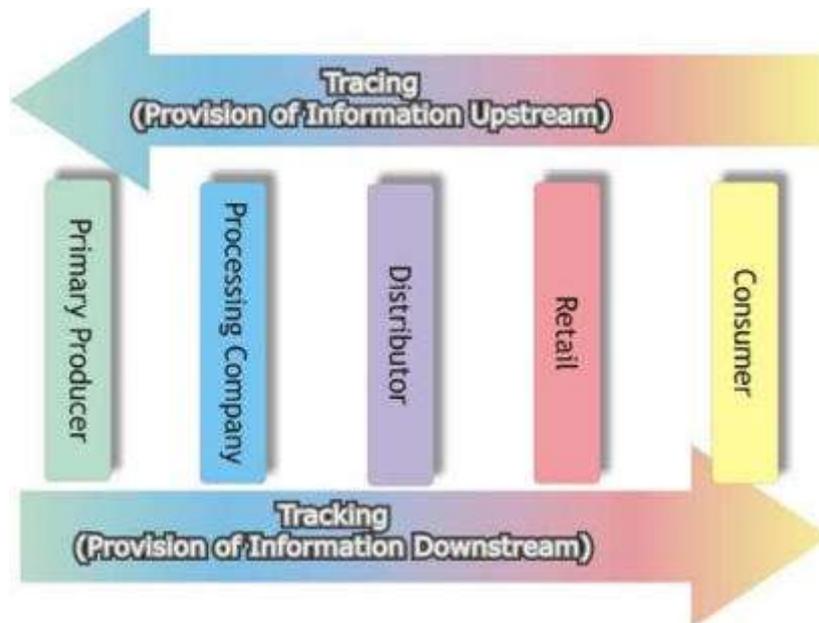
Sources: Extracted from Salampasis, M., et al. (2012)

Hence from this framework, the researchers came out with the flowchart for GTSS system as below.

Figure 2: Flow Chart of GTSS System (Ordering and Notification)

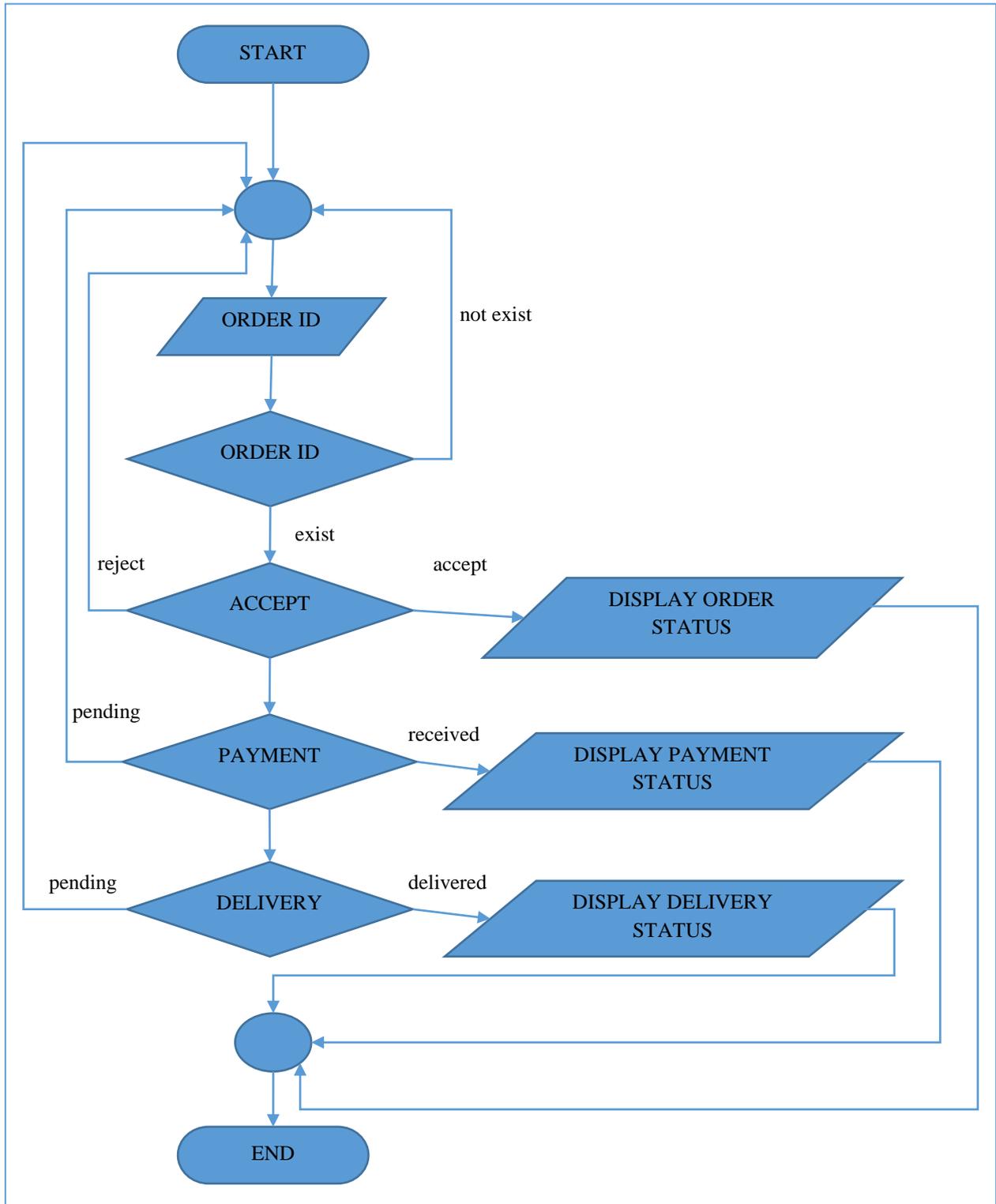**Figure 3: Flow Chart of GTSS System (Tracking)**

Figure 2 and 3 shows the process of GTSS system where it starts with ordering from an agent/a customer, notification and tracking. Figure 2 shows an ordering process where an agent/a customer order through online from the company website. The agent/customer will get an order ID as a reference. The order will be taken and submit to an administrator for verification. After the verification, the printed invoice will be sent to warehouse staff to check

whether the goods available or not in the warehouse. If the goods available, the warehouse staff will inform the administrator and the administrator will notify the agent or customer through email and ask for payment. When the agent/customer agree to purchase the goods and payment has been made, another notification will be received by the agent/customer to inform that payment has been accepted by the company. The warehouse clerk will update delivery status of the goods through email. Then the goods will send to the agent/customer on that day.

Figure 3 shows the tracking of the goods from the order is accepted by the administrator. Here the company can track the order through their web system. The system will display the order status from the agent/customer and automatically check if the goods available or not in the warehouse. After check the availability of the goods and the agent/customer has made a payment or vice versa, the display of payment status will appear in the system. Then the warehouse clerk will start to make a deliver of goods to the agent/customer. In the system, delivery status will display if the goods have already sent to the agent/customer. If the goods not deliver yet the pending status will appear in the system. After all the process done, the warehouse clerk will update the status through online system after received an invoice and will do a route settlement upon delivery of goods. The system will automatically update the quantity of stock in the warehouse so that it is easily for the company to keep track the stock in hand.

The table below shows how the systems work.

Table 3: GTSS order system

Key Type: Primary Key (PK) Foreign Key (FK)	Attribute/Field Name	Compulsory to be filled	Data Type	Description for data to be stored
PK	ord_ID	Auto	Text	Generate ID for order
PK & FK	ord_Prod	yes	Text	Product Code for order
	ord_Qnty	yes	Text	Quantity of order product
	ord_Date	auto	Date	Date order
FK	ord_Cust	yes	Text	Customer ID
FK	ord_Agent	yes	email	Agent ID
	ord_Status		Accept/Reject	Status order
	ord_StatusDate	auto	Date	Date order accept
FK	ord_StatusBy	auto	text	Seller ID
	ord_Payment		Received/Pending	Status Payment
	ord_PaymentDate	auto	Date	Date payment receive
FK	ord_PaymentBy	auto	text	Seller ID
	ord_Delivery		Delivered/Pending	Delivery Status
	ord_DeliDate	auto	Date	Date delivery
	ord_DeliCode		text	Delivery tracking number

	ord_DeliBy		Drop Down List	Delivery company Name
FK	ord_Storeby	auto	text	Store Keeper ID

BENEFITS AND BARRIERS OF GTSS

Among the benefits that offered by GTSS are first and foremost eliminate paper processing in terms of tracking and tracing as well as its associated inefficiencies and cost. Here the company can keep track through online the safety stocks without need to use manual system. The company can achieve efficiency and improvement in managing the inventory. Besides that the company can easily do an execution planning for their inventories and shipment.

Through GTSS system the company will enable the truck or transport the goods to the customers more faster. By having this system the company can serve customers better in terms of delivery services. When this happen it can build trust and confidence to repeat purchase with the company. This can create a long term relationship between customers especially the agents and the company. This encourage the agents to exclusively distribute the company's products in the market.

The other benefits of GTSS are reduce cycle time to complete business transactions whereby using GTSS the process to complete the business transactions can be more faster because customers do not have to wait for a long period. All the notification and delivery status are updated in the system where the company can check through online and the customers can see the notification sent by the company through email. Here information sharing between the company and the customers especially the agents also exist. This can lead to mutual trust and mutual understanding among the company and the agents.

However there are several obstacles in applying GTSS especially among SMEs such as establishing standards (Florence & Queree, 1993). To apply GTSS, the company needs cooperation between partners which are their suppliers and intermediaries such as wholesalers, retailers, distributors, agents and dropships. Both parties need to communicate to required an agreed system standards to apply in tracking and tracing the goods. By having an established system standards, the process of tracking and tracing can be done smoothly.

Another barrier is level of costs (Florence & Queree, 1993) required to use the system. Although it is web based but to set up the system requires investment. Some of the investment is the cost to develop the system and expertise to build the system. For GTSS system, the design of the system is subject to the company needs and requirements. If the needs and the requirements for the design of the system is high, the higher the costs the company needs to invest. To make the investment worth, SMEs should choose the right and appropriate system for their company.

Besides that to manage and maintain the system is a challenge for the company as well as to selecting appropriate staff to run the system (Florence & Queree, 1993). Therefore SMEs should provide training to internal staff so that they are able to manage and maintain system for the company. Another way to maintain the system is to encourage and cooperate with SMEs' partners to use the system together because not all partners want to use the system if they already have their own systems in the company.

CONCLUSION

Goods Tracking and Tracing System (GTSS) for SME is an important way to replace the manual supply chain system. The purpose of GTSS is to control and handling the ordering

and movement of the goods from the company until the goods reach to the agents/customers. GTSS also enhance quicker managing in inventory especially in order processing and delivery process. The design is subject to clients need and in future it can be improvise and upgrade using additional device such as mobile application to help in updating the delivery of goods. However, GTSS system is still in conceptual phase and needs to be applied in practice in order to identify and analyze the potential issues for further improvements.

REFERENCES

Florence, D., & Queree, C. (1993). Traceability – Problem or opportunity? *Logistics Information Management*, 6(4), 3-8.

Junaidah, H. (2007). Information communication technology (ICT) adoption among SME owners in Malaysia. *International Journal of Business and Information*, 2(2), 221-240.

Li, Z., Liu, G. Liu, L., Lai, X., & Xu, G. (2017). IoT-based tracking and tracing platform for prepackaged food supply chain. *Industrial Management & Data Systems*, 117(9), 1906-1916.

Mousavi, A., Sarhadi, M., Lenk, A., & Fawcett, S. (2002). Tracking and traceability in the meat processing industry: a solution. *British Food Journal*, 104(1), 7-19.

Norasikin, S., Norailis, A. W., & Izlawanie, M. (2014). Strengths and weaknesses among Malaysian SMEs: Financial Management Perspectives. *Procedia-Social and Behavioral Sciences*, 129(2014), 334-340.

Salampasis, M., Tektonidis, D., & Kalogianni, E. P. (2012). TraceALL: a semantic web framework for food traceability systems. *Journal of Systems and Information Technology*, 14(4), 302-317.

SME Corporation Malaysia (2013). *Guideline for new SME definition*. Retrieved from http://www.smecorp.gov.my/images/pdf/Guideline_New_SME_Defintition_updated. pdf.

Zimmermann, R., Hofman, O., Bodendorf, F., Huber, A., & Gorz, G. (2001). *Agent-based tracking and tracing for controlling fulfillment-processes in supply chains*. Retrieved from http://wwwdh.informatik.uni-erlangen.de/IMM8/staff/Goerz/Passau2000_final.pdf.