

A Qualitative Case Study on the Adoption of Smart Warehouse Approaches in Malaysia

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Abstract. This qualitative case study explores the factors that influence the adoption of smart warehouse in Malaysia. Purposive sampling is used to carry out this research by conducting interview discussion with several respondents. Lack of warehouses in Malaysia is that adopt smart warehouse and still on manual operation. In this study, a discussion report would be done relating to the TOE framework (technological, organizational and environmental) influences in adopting smart warehousing. The types of technologies being implemented in the warehouses in Malaysia are being evaluated and further discussed on the similarity of thoughts. The findings of this research show that most respondents agree that implementing smart warehouse approaches would bring relative advantage. Warehouses in Malaysia in terms of technology implementation are still at very surface and backwards. Top management and cost are two factors that would influence organization readiness towards smart warehousing, whereas external pressure, government support and geographical location would influence the adoption of smart warehousing. This research can be used as a reference for future researches on encouraging warehouses in Malaysia to adopt smart warehouse approaches.

1 INTRODUCTION

In a world of increasing market volatility, higher product complexity, shorter product life cycles, and global supply chains, companies are moving towards a more flexible and responsive business trend [1]. The advancement in the logistics sector tends to increase its capability to meet rapid growing of business and vast developments. According to Goksoy et al. [2], warehouses and distribution centres acts as an important component of the supply chain. Warehouses are always looking at moving up the value chain by adding value added services in the warehouses and not just focused on storage alone but integrate several functions to ultimately provide an efficient operation. Smart warehouse are essential facilities that allows many business processes to be interconnected across the cyber network. According to Laursen et al. [3] system implemented in smart warehouses is able to adapt different business and it is intelligent enough to run business operations with minimal human intervention. Jabbar et al. [4] stated that smart warehouse is designed to operate with maximum efficiency by incorporating best practices, automation and other technologies to ensure that it can function at the highest level in an ever-changing marketplace.

Warehouses tend to move from being manual to automation and positively progressing towards digitization [5]. In the warehouse, automation is generally used to make gains upon existing processes by

improving efficiency, speed, reliability, accuracy and eventually cost savings [6]. Automation comes in various forms including physical material handling equipment and integrated information system. Industry 4.0 as explained by Marr [7], is where computers and automation comes together with and integration of robotics connected to systems equipped with machine learning algorithms that could control the robots and requires only very little input from human.

A wide variety of companies from e-commerce to manufacturing are looking for solutions to improve efficiency, speed and transparency [8]. Technological advances reduced the size of the devices, improved performance and energy efficiency, and reduced production costs [9]. Dotoli et al. [10] describes warehouse management system is a database driven computer application, which is used by logistics personnel to improve the efficiency of the warehouse by directing cutaways and to maintain accurate inventory by recording warehouse transactions.

There were three established models found within the literature that are related to the acceptance of technology: diffusion of innovation, technology acceptance model, technology organization environment (TOE) framework. Diffusion of innovation (DOI) is a fundamental theory that guides technology adoption studies [11]. It suggests that innovation characteristics are one of the variables that patterns in adoption of innovation. Innovation Characteristics is further explained by Ngah et al. [12], that adoption of technology will result in five determinants which includes relative advantage,

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compatibility, flexibility, observability and trialability. Technology Acceptance Model (TAM) was introduced by Fred Davis in 1986 with the basis of an adaptation of theory of reasonable action [13]. TAM is specifically tailored for modelling users' acceptance of information systems or technologies. The basic TAM model included and tested two specific beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU) [14-16]. Baker et al. [17] explains that Tornatzky and Fleischer developed the TOE model to evaluate technology adoption. The TOE framework has become an important model in technology adoption as it can be applied to different types of organizational innovation adoption [12, 17]. In addition, the support and direction of the top management of an organization plays an important role in the choice of suppliers for the company, and this would in turn affect the process of adoption of smart warehousing in the company.

Malaysia having a technologically inclined economy proves the country's involvement in advanced electronic manufacturing, logistics, research and development, biotechnology, innovation and highly automated manufacturing sector [18]. With the increase in manufacturing activities stated in [18], no doubt there is a tremendous increase in international trading activities. Warehouse development is one of the key action plans mentioned in the Logistics and Trade Facilitation Masterplan which is designed by Malaysia Ministry of Transport (MOT) is to provide guidelines and strategies to enhance the efficiency and the effectiveness of the transport and trade facilitation mechanisms, to provide a better environment for the logistics industry in the domestic and international markets and to improve productivity of the freight logistics industry [19].

In the current economy growth, companies have witnessed three times industrial revolution; Marr [7] shares that companies are moving towards the fourth industrial revolution which could be adopted in various industries including manufacturing, warehousing, transportation and others. Malaysian tech industry reflects on the industrial revolution and shares its opinion towards companies that are left behind due to complacency or lack of knowledge, will be impacted disastrously [20].

Although with Malaysia's government body involvement of Eleventh Malaysia Plan 2016 – 2020 on reducing unnecessary regulatory burdens on business, warehouse services perspective; there are not much emphasis on warehousing automation or smart warehousing that could contribute to de-bottlenecking situation at ports or warehouses [21]. Bahrin [22] that there will be a shift of warehouse operations by investing in advanced technology to cater for large volume shipments for years to come. Malaysia warehouses should be able to face these changes otherwise when shipment arrives Malaysia, there will not be sensors or wearable devices to manage the information and would eventually cause disruption across the supply chain. A typical issue faced by companies in adapting smart warehousing is pointed out by Luff, [23] whereby the mindset of companies in trying to salvage the existing

warehouse management system that has been long outdated. Many companies have sought to less expensive solutions to address their needs but failed to re-evaluate the return of investment that incorporates upgrading the warehouse software with advanced technology.

Luff [23] addresses the problem stated in this research which particularly focuses on the lack of warehouses in Malaysia that adapt smart warehouse and still on manual operation. Furthermore, on researches that was within Malaysia focused more specific implementation including business intelligent system in SME [24] or green warehouse in Malaysia [25].

In this study, a discussion report would be done relating to the TOE framework (technological, organizational and environmental) influences in adopting smart warehousing. Smart warehouse could include technology such as Internet of Things (IoT), RFID and automation in warehouse activities. Five companies will be interviewed in regards to the adoption of smart warehousing practice in Malaysia. The objective of this study was to evaluate the current technologies implemented in warehouses in Malaysia that can be associated with smart warehouse, identify the influences of organizational readiness towards smart warehousing, and understand the external environment factors that could support the implementation of smart warehouse. In this paper, the finding is different, in terms of method, respondents and research objective. The research gap is identified whereby no related research on the adoption of smart warehouse in Malaysia. The method of findings is by interviewing the respondents and analysing from the response from an unstructured question.

2 METHODOLOGY

2.1 Research Design

This study is in the form of an exploratory research which uses qualitative means to gather data in regards to the adoption of smart warehouse approach in several warehouses in Malaysia. This segment describes detailed case study methods, inspects the application of case study methods, and also investigates the particular detail and accuracy of case study methods. Qualitative case study employs a naturalistic method that searches and investigates happenings and occurrences within a specific event and has a narrow and very well-defined scope, and in such a case study, the researcher is the instrument of research [26]. One of the benefits of a qualitative type research is that the information obtained is richer and it gives a deeper knowledge about the topic of focus in the case study. Validity and reliability are key indicators of the quality of measuring instrument which increases transparency and decrease opportunities to insert researcher bias in qualitative research [27]

2.2 Sampling Design

In this study, non-probability sampling design approach is used where the data collected will be analysed to

understand TOE (Technology, Organizational and Environmental) factors for the adoption of smart warehouse in Malaysia. The research data will be collected from one respondent of five different companies which includes various managerial positions which is General Manager, Director, Senior Manager of distribution centre operations, Assistant Manager of operations and Senior Manager of operations. These professionals are in charge of their respective functions and are very knowledgeable in regards warehouse efficiency and to relate with smart warehousing approaches.

2.3 Sampling Size

The scope and nature of this case study is specific and clear where it involves the technology being

implemented in warehouses in Malaysia towards smart warehousing approach. The quality of the data gathered will be based on the information obtained from all the respondents. Due to time constraint, sampling size for this research is based on 5 individuals from 5 different companies at managerial position and above. All five companies from the service provider whereby 4 companies are 3PL service provider and 1 company as 4PL service provider.

2.4 Conducting the Research

As this case study focuses on the use and adoption of smart warehouse in Malaysia, the framework for this study is created as shown in Figure 1.

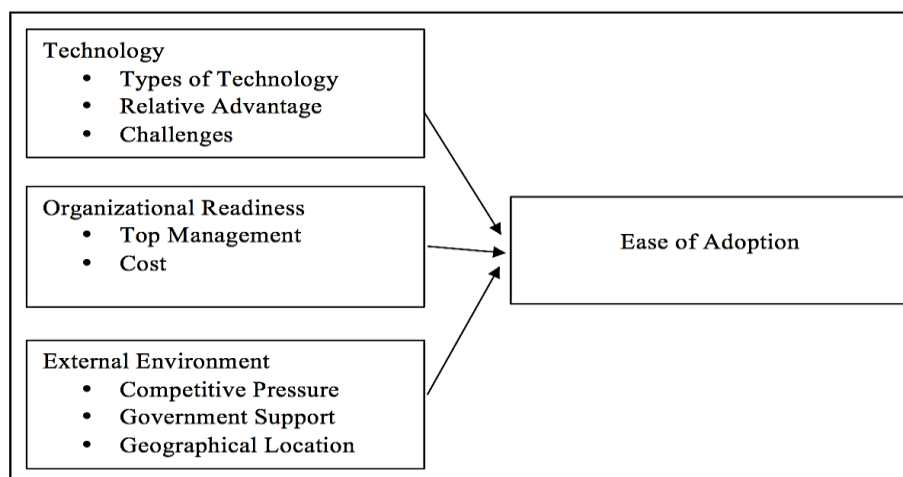


Figure 1. Research framework

The interview was done by face-to-face approach, over the phone and via Whatsapp messaging. Such selected respondents are Director, General Managers, Senior Managers and Assistant Manager. The first respondent is from a third-party logistics service provider at a senior manager position for operations position. The interview was conducted within an hour via mobile phone and the whole conversation was recorded and converted into conversation transcript. The second respondent is a senior manager of a fourth-party logistics service provider and the interview was conducted face-to-face in Klang, Selangor. The duration of the interview was within an hour and was recorded for the data gathering purpose and to be converted into transcript. The third respondent is an assistant manager of a third-party logistics, the fourth respondent is the director of third-party logistics and the fifth respondent is the general manager of the company. The interview was

conducted within an hour via mobile phone and the whole conversation was also recorded and converted into conversation transcript.

2.5 Research Instrument and Data collection

The aim of this research is to evaluate the factors that influence the adoption of smart warehousing in Malaysia. The method of interview is a functional tool in collecting data for qualitative studies. Therefore, open-ended interviewing methods are adopted for this research to gain opinion from the professionals in the industry. In preparation of the research instrument, a list of open-ended interview questions was formed deriving from the research questions. All respondents were given the same list of questions and were provided earlier than the scheduled interview. The interview questions were divided into four sections as shown in Table 1.

Table 1. The different parts of the interview questions

PART	DESCRIPTION
A	Demographic background of the respondents
B	Technology influence in smart warehouse adoption
C	Organisational readiness in smart warehouse adoption

D External environment factors that influences the adoption of smart warehouse

2.6 Data Analysis

The approach of data analysis done for this study is illustrated in Figure 2. This analysis begins with identifying the problem statement for this research then formulating research questions. Based on research questions, theoretical sampling and interview questions is

prepared. The collection of data is done through interviewing and grouping the data with constant comparison. The similarity and outlier or respondent's thoughts is categorized and finally explore the relationship between the categories of thoughts in relate to the research questions and objectives.

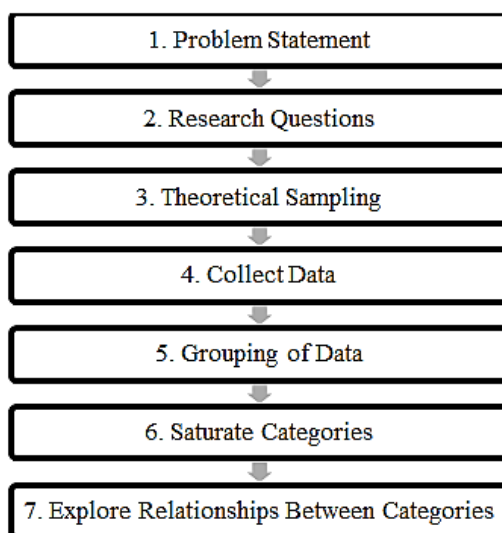


Figure 2. Data analysis steps

3 RESULT AND DISCUSSION

3.1 Respondents Background

In this case study, there were five respondents from five different companies that were interviewed. The first respondent, Mr VC is a senior operations manager in a third-party logistics company. Mr VC has 8 years working experience in this logistics company handling very well-known apparel brands in the warehouse.

The second respondent Mr T is a distribution center operations senior manager in a fourth-party logistics company which focuses more on healthcare products. He has a professional working experience in the logistics industry for around 22 years. With that amount of working experience, Mr T's input on this research would lead to more in-depth experience on the actual experience in a warehouse and what factors would influence adoption of smart warehousing.

The third respondent was Mr RS who is an operations assistant manager in a third-party logistics company which focuses on very well-known electronic brands. Mr RS also has many years of experience in the logistics industry, having many accounts under his supervision; his opinion on this research paper will significantly contribute to the findings of this research.

The fourth respondent Mr DC is currently a director of a third-party logistics company which he just started 3

years ago. Previously Mr DC was also a director of another 3PL company with 13 years of working experience in the logistics industry in total. With his professional experience and influence from the top management point of view, he was able to share more detailed and concerns from higher management especially as business owner.

Final respondent for this research study is Mr K who is the General Manager of a third-party logistics company focusing more on airfreight cargo and oversee other warehouses as well. Mr K has 25 years of working experience in this logistics line. His knowledge and experience more on air freight warehouse cargo handling in relation to smart warehousing implementation could be strongly evaluated and explored.

3.2 Interview Outcome

The interview was done using questionnaire and the outcome of the interviews were tabulated and categorized according to its theme and sub theme. Table 2 shows the summary output for technology advancement. Table 3 shows the summary output for Current Practices in Malaysia. Table 4 shows the summary output for operation efficiency. Table 5 shows the summary output for Organizational Support. Table 6 shows the summary output for external environment.

Table 2. Summary output for technology advancement

THEMES	CATEGORIES	SUB-CATEGORIES
Technology advancement	Technology	<ul style="list-style-type: none"> - Smart warehouse refers to advanced technology - Advanced system, using high technology - advanced technology commonly used WMS - Systems to improve productivity, less error and reduce cost
	Warehouse Systems	<ul style="list-style-type: none"> - Implement Warehouse Management System (WMS) - Implement SAP system and internal system called Lighthouse - Implement internal system called B.R.O excel
	Scanners	<ul style="list-style-type: none"> - Handheld RDT - QR Scanners - RF Scanners
	Material Handling Equipment	<ul style="list-style-type: none"> - Battery operated forklifts
	Implemented by MNC Company	<ul style="list-style-type: none"> - Mostly foreign companies are into high technology - Foreign company using better technology - Mainly foreign MNC company and not SME

Table 3. Summary output for Current Practices in Malaysia

THEMES	CATEGORIES	SUB-CATEGORIES
Current Practices in Malaysia	WMS / Manual System	<ul style="list-style-type: none"> - Companies use surface level of technology such as WMS or not manual - Malaysia companies are not innovative, basic system or manual work - Malaysia companies are still backwards and common ones is WMS - SME prefer manual rather WMS - Challenges faced in terms of high cost in investing in automation, gadgets for MHE, charged based on man hours

Table 4. Summary output for Operation Efficiency

THEMES	CATEGORIES	SUB-CATEGORIES
Operation Efficiency	System Reliability	<ul style="list-style-type: none"> - Respondents agree that implementing advanced technology is reliable - More reliable than manual approach
	Improve Performance	<ul style="list-style-type: none"> - Better performance and reduce waster - Performance is better than manual picking - Performance is good - Improve performance and reduce error
	Increase Productivity	<ul style="list-style-type: none"> - Increase productivity - Inventory accuracy, precise measurement on delivery performance and overall KPI and productivity - Fast and accuracy, picking can be done more accurately, saves time and increase productivity - Fast and accurate - High productivity improves profit & loss account
	Relative Advantage	<ul style="list-style-type: none"> - Agrees that technology being implemented in warehouse is crucial and would lead to relative advantage - Companies should change and start adopting smart technology - Implementing smart technology in warehouse would provide greater value to warehouses
	Achieve Sustainability	<ul style="list-style-type: none"> - Respondents agrees that implementing smart warehouses approaches would promote warehouse sustainability - Efficient and effective - With the usage of battery operated MHE, emission is eliminated
	Real Time Efficiency	<ul style="list-style-type: none"> - Client always request for real time information - WMS able to provide near to real time information - Real time information required on the delivery status
	Achieving ROI	<ul style="list-style-type: none"> - Running for a long period, reduces the cost per unit - Achieve ROI within 12 months - Perfect result, increased productivity, increased sales will gradually improve P&L account

Table 5. Summary output for Organizational Support

THE	CATEGORIES	SUB-CATEGORIES
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Organizational Support	Top Management Involvement	<ul style="list-style-type: none"> - Top management plays a big role and would influence business directions - Top management would give final approval and permission for a project to proceed - Top management would decide where the industry is moving towards and will drive the implementation of smart warehouse technologies - Budget approval granted by top management
	Company Direction	<ul style="list-style-type: none"> - Company direction on their future, how technology affect the future outcome - Top management would lead the company's direction - Management direction on where they are heading that fiscal year whether organic or aggressive growth
	Training	<ul style="list-style-type: none"> - Challenges faced during infancy of technology implementation, training needs time - Requires time to train staff especially foreign staff due to language and educational barrier - Foreign worker handling MHE will have constraint during training - Staff involvement to follow SOP - Experts will train the staff - Most software is user friendly and management will provide training - Typically take from 2 weeks to 2 months to train staff with new technology.

Table 6. summary output for external environment

THEMES	CATEGORIES	SUB-CATEGORIES
External Environment	Competitive Pressure	<ul style="list-style-type: none"> - There would be pressure from companies surrounding but within 15%-20%, another respondent says 50% - Depends on the nature of business in relating to the competition whether its required or not
	Government Intervention	<ul style="list-style-type: none"> - To support by reducing import/export charges - Reduce or levy on import tax - Reduce / withdraw import permit - To provide expertise from foreign country to support local warehouses in terms of technology and knowledge enhancement

3.3 Overall Discussion

The first research objective is achieved by investigating the current technologies implemented in respective respondent's warehouse, the reliability, benefits, performance, challenges and opinions on other warehouses implementing smart approaches in Malaysia was also discussed. In order to understand the research questions towards smart warehouse approach, all respondents explained their opinion on how they define smart warehouse. 4 of 5 respondents define smart warehouse as implementing advanced technology into daily activities of warehousing such as getting things to be automated or adapting to latest changes in the industry to meet its ultimate benefits in the warehouse. Whereas, respondent 4 do not quite understand the term of "smart" but later on explained that current warehouse management system in use is considered as common practices and would not classify under smart approach.

As a summary on technologies being implemented by the warehouses that has been interviewed, 3 out of 5 respondents implement warehouse management system to manage their warehouse activities. Respondent 2 warehouse is currently using SAP and light house system that is integrated with the global office in Switzerland and respondent 5 do not have any advanced system in the warehouse and is currently using a BRO excel system to

manage the warehouse operation. 4 out of 5 respondents implement battery-operated forklifts in the warehouse and only respondent 5 do not have battery-operated forklift. In terms of equipment being used in warehouse 3 out of 5 respondents are using scanners such as handheld RDT, QR codes scanner and RF scanner. Only 3 respondent has different technology compared to the rest of the respondents which is RFID tags and bar-coding system in the warehouse. Other the hand, respondent 5 do not have any scanners or any other technologies aside for the ones mentioned above.

For future technology implementation, 4 of 5 respondents mentioned about the consideration to implement future technologies which includes automation in warehouse, digitalization, RFID and bar coding. Respondent 2 highlighted that with the existing SAP and light house system the company already at 99.99% inventory accuracy. Respondent 5 who is currently using BRO excel system highlighted that their company is moving towards warehouse automation next year which include automating inventory management, picking and document handling.

In terms of reliability, all five respondents agree that technologies' being implemented in their respective warehouses is reliable. Among those positive reasoning of technology being reliable, respondents mentioned that technology creates longer life span and sustainability. Turnaround time is fast which meets company's KPI,

inventory accuracy which errors can be reduced significantly and with technology implemented, it is ever accessible with real time information.

In terms of performance, all 5 respondents agreed that implementing technologies in the warehouse would improve the performance of the warehouse operation. The summary of all ways of performance improvement includes eliminating waste, increase productivity, enhance efficiency, operations can be green, inventory accuracy, fast in handling activities and overall accuracy in inbound and outbound activities and lastly on systems are able to correct human intervention which ultimately eliminates errors.

In the aspect of benefits, all 5 respondents agreed that implementing technologies would bring benefit to the organization. Among those benefits highlighted by the respondents includes increased productivity, eliminate waste, fast and accuracy in picking. Respondent 2 also emphasized that with current technology being implemented in the warehouse, it enables precise measurement in terms of on time delivery performance from the time order is handover to the outbound, within 3 hours the transport person needs to make the final scan and truck must leave the warehouse within 5 minutes. Hence, precise measurement promotes performance towards good KPI. In addition, respondent 5 mentioned that with future implementation of technology, it will be able to improve the organization's P&L account.

Despite the positive part of implementing technology, there also challenges that is being discussed by the respondents. 2 out of 5 respondents mentioned that cost is a challenge in terms of implementing advanced technology. Furthermore, respondent 2 and 3 highlighted that the challenges would be during the initial implementation of adopting to the changes before the system "Go Live" and also in terms of educating down liners in the new technology implemented. On the other hand, respondent 4 emphasized on existing experience from other logistics companies' feedback on ASRS implementation would bring high maintenance cost. Hence the maintenance budget has to consider periodical maintenance and how to source the parts meant to be changed. Furthermore, respondent 4 also shares that technical expertise within the local providers is still limited. Whereas for respondent 5, challenges in mind would be on the internet speed to support advanced technology and also human intervention of not following SOP.

In the view on Malaysia warehouse implementing latest technology in the warehouses, all 5 respondents gave a negative view on it. Among the overview of opinions by respondent 1 and 4 is that Malaysia warehouses are still backwards and at very surface technologies such as system software which is WMS, scanners or the most at ASRS and hardly see any warehouse with huge automation in logistic industry. Respondent 2,4 and 5 highlighted that mostly foreign companies implement these technologies and the reason behind it could be cost as mentioned by respondent 2,3,5; not innovative and local sentiments were added by respondent 2 and lastly respondent 1 mentions lack of expertise in this sort of advanced technology.

Overall for technology influence and implementation in warehouses, all 5 respondents agree that implementing technology in warehouses is crucial and would lead to relative advantage. Respondent 1 added that technology is the future and companies should move towards automation and digitalization to achieve long-term sustainability and cost efficiency. Respondent 4 also adds on that companies need to adopt technology in order to get warehouses ISO certified.

To summarize questions 1 to 5 in the interview questions and from the feedback of the respondents, objective 1 to study the current technologies implemented in warehouses in Malaysia that can be associated with smart warehouse has been achieved.

The second research objective is achieved by identifying the influences of organization readiness towards smart warehousing in respective respondent's warehouse, the top management influence and cost aspect was discussed. On the top management influences towards smart warehouse, all 5 respondents agree that top management plays a big role. Respondent 1 and 4 comments that top management influences the business directions and they are really the big drivers will drive the whole company towards this implementation. Respondent 2 and 3 shares that top management will give the final approval whether to proceed with a project and to approve budget costing. Respondent 5 further explains that in order to get approval from the top management, the operation personnel will need to do the paperwork on implementation of a new technology so that top management can further evaluate. Cost incurred is agreed by all 5 respondents that it is high.

In terms of return of investment in implementing smart warehouse, respondent 1 emphasize on long-term and on how to sustain the business by looking at a much-reduced cost in the future as the cost per unit will be reduced. Respondent highlights that yes, there will be return of investment but all technology implemented must give a faster ROI which is within 1 year. For respondent 3, there will be ROI after the first year of implementation as normally their clients has 3 years contract and only after that can get more revenue. For respondent 4 on the other hand shares in terms of system there would be ROI when handling high value or high velocity goods but if the direction is more to If upkeep inventory accuracy then the ROI it will be low. Respondent 5 shares his point in terms of future implementation, investing high cost to increasing productivity and sales and would eventually bring up the figures and improvise profit and loss account.

Respondent 1 and 5 shares that the top management would affect the implementation for smart warehouse positive or negatively depending on the willingness to invest, to adopt to changes and to also evaluate future implementation. Respondent 2 whereas emphasized that top management should have direct involvement in the new technology implementation. Respondent 3 and 4 shares their view on mainly top management affects in terms of budget approval and the business strategies they plan to move towards.

The third research objective is achieved by identifying the influences of external environment towards smart warehousing in respective respondent's warehouse, external party which includes customer, competitors, Malaysia Government was discussed.

All 5 respondents do experience customer requesting for upgrade in technology. They view themselves as a service provider hence customers would always demand for real time updates. In terms of what technology client request is not specified as long any sort on implementation to improve the efficiency and how consistently output is provided. Furthermore respondent 2 highlights that upgrade of technology is usually the other way around as a service provider they urge customer to implement compatible system.

In the aspect of Malaysia Government, respondent 1 and 3 emphasizes on levy on taxes or at least reduce in import and export taxes. To levy taxes on importing automated industry equipment will ease importing process of advanced equipment paying a large amount on the duty. Respondent 1, 2 and 3 has similar thought of adopting other country practices such foreign expertise and ethics Respondent 2 strongly feels that with the Malaysian mindset, it is a long way for the Government to go all out to promote better technological advancement and having it in place. Respondent 4 emphasizes that Government should initiate more localized programmers, some sort of subsidy given to local companies to start up the programming. For respondent 5 suggest that Malaysia Government could withdraw or reduce the regulations under SIRIM for importing electric gadgets. Government should be able to smoothen out the process in setting up warehouses by aiding paperwork process in government entities.

Respondent 1 mentions that warehouses built to be much more efficient and would increase productivity at the same time eliminate waste. Hence in long term, implementing a certain technology with all the safety factors, it can help to promote Go Green environment. Respondent 1 and 3 indicates that emission of diesel from forklifts into the environment is eliminated after the use of battery-operated forklifts. Respondent 2 finds warehouse sustainability in terms of giving the best solutions in the aspect of effective and efficiently hence creates sustainability. Whereas for Respondent 5, sustainability would only be present in MNC's companies rather than SME but as overall finds that implementation of technology promotes sustainability in a positive way.

Finally, by interviewing all 5 respondents it shows that warehouses in Malaysia is still far behind in implementing more advanced technology rather than manual approaches. All 5 respondents highlighted the importance of implementing smart approaches in warehouses with the least consideration of implementing warehouse management system (WMS), battery operated forklift, RFID, barcoding and QR scanners in their warehouses. Furthermore, as highlighted by these 5 respondents their companies are still moving forward with future plans in upgrading the efficiency in the

warehouse by moving towards picking automation, AS/RS and digitalization.

From the research, most respondents supported the point that technologies are usually being implemented by MNC companies as the direction and drive from the global headquarters which falls to the influence of top management. Hence if Malaysia local warehouses would like to improve the business opportunities in comparison to MNC companies, then the approach has to be moving towards upgrading technologies in the warehouse to improve productivity, efficiency and able to provide real time information to customer and ultimately leads to customer satisfaction.

4 CONCLUSION

In conclusion, this research study is successful by the evaluating the information gathered from the respondents whereby the objective of the study is achieved and there are more that the conceptual framework that could influence the adoption on smart warehouse approaches. Among the five companies it can be said that 4 respondents do have smart approaches in the warehouse and they are looking towards future changes by maintaining adaptability, sustainability and mobility in the operations. Whereas for the other 1 respondent is moving towards implementing automation next year and only actual experience can be considered rather than opinion on something yet to be implemented.

For an overall for objective 1, it can be said based on the 5 companies we have several technologies being implemented which mainly on systems that includes warehouse management system, SAP, light house and BRO excel system. Furthermore, RFID, bar coding, scanners and battery-operated forklifts are also being used is few of the warehouses. Automation and digitalization are the future technology that these companies are moving towards in future. Respondents also highlight that warehouses in Malaysia is still left behind in implementing these technologies in the warehouse.

Next on research objective 2, it can be concluded that top management plays a big role in technology implementation and they are the main influence in driving the company's goals and how the business is meant to run. Hence top management must have the willingness to look into the ROI compared to the initial investment as most respondents agree on the ROI with approximately 1 to 3 years in average.

On the final research objective 3, it is concluded that external environment do influence the adoption of technology in warehouses particular on the request by customers, Government involvement, geographical location on warehouses located and localization of workforce. On the influence of logistics competitor, 2 out 4 respondents mentioned that not entirely influence at a certain percentage only. Whereas, one respondent said that their warehouse is already advance in terms of technology and is in-fact is the leading company in compared to other competitors

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