Research in Management of Technology and Business Vol. 4 No. 1 (2023) 487–499

RMTB

Homepage: http://publisher.uthm.edu.my/periodicals/index.php/rmtb
e-ISSN : 2773-5044

Foresight Study on the Adoption of Autonomous Robots for Parcel Delivery

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DOI: https://doi.org/10.30880/rmtb.2023.04.01.033
Received 31 March 2023; Accepted 30 April 2023; Available online 01 June 2023

Abstract: The use of innovative technology like autonomous robots is important as consumers become more demanding and expect to get faster delivery from the seller. This has urged the parcel delivery industry to provide better and efficient services to customers. However, the current delivery services are still getting complaints including late delivery, unacceptable condition of goods received and poor customer service. Further, the issue of failure to deliver parcels on time is a big problem among consumers who had experience using services delivery in Malaysia. One of the inventions created to solve these problems is through the adoption of autonomous robot technology for parcel delivery (ADR). Thus, this study aims to determine the key drivers as well as finding the future trends of the adoption of ADR in Malaysia. A mixed method approach which consists of STEEPV and quantitative study have been used in this research. There are ten factors that have been merged from the STEEPV method. The data has been analyzed using Statistical Package for Social Science (SPSS) software. Impact uncertainty is analyzed based on the key drivers and issues from the qualitative and quantitative methods. Ten merged key drivers and issues have been identified. The impact-uncertainty analysis approach had been used to identify the future trends of autonomous robots' adoption. 30 questionnaires had been distributed to consumers who had experience using conventional methods of delivery in Malaysia with response rate 42.19%. This study found that using autonomous robots to deliver packages can save money and autonomous robots for parcel delivery can prevent theft as it has a robust detecting mechanism that has the highest impact and uncertainty. Four scenarios were proposed at the end of the study. The four scenarios were new advancement, lost trust in autonomous robot technology, cyber security risk and high demand autonomous robots.

Keywords: Autonomous robot, parcel delivery, STEEPV

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1. Introduction

The advancement of technology such as Internet of Things (IoT), cloud computing, artificial intelligence (AI) has changed the landscape of various industries including delivery, postal and courier sector (Reis *et al*., 2020) . Further, with the Covid-19 pandemic, consumers preferred to stay at home and buy groceries through online platform (Song & Han, 2020). Further, the existence of these innovative technologies like the internet and smartphones has made more shoppers move to online platforms to expand their business (Arbanas *et al*., 2016). Thus, logistic companies can take this opportunity to upgrade their delivery systems by using autonomous delivery robots (ADRs) technology.

Autonomous delivery robots (ADRs) are defined as electric powered motorized vehicles that can deliver packages without the intervention of any human being (Figliozzi, 2007). In Malaysia, the increasing number of parcels from online shopping has made the warehouse to increase their workload (Siali *et al*., 2018). Most delivery companies have to find solutions to improve their delivery services. In addition, ADR for contactless package deliveries and the tremendous market interest have been pushing ADR developers to provide large-scale deployments required by several real-world businesses. This autonomous robot is more secure than drone delivery in that someone may just pick up a parcel that does not belong to them because the drone simply placed it without the owner's permission (Creswell, 2012).Unlike autonomous robots, there is no possibility of a missing parcel because the parcel is delivered at the time specified by the consumer. ADRs need to be deployed by logistics service providers and government agencies conforming to the expectations, needs and motivations of consumers. By having this technology, Malaysia can compete with other countries in the next 10 years with this advancement technology.

Using an autonomous robot can assist consumers in scheduling when they want to collect their shipment (Chen *et al*., 2021). As a reminder that their item has arrived, the customer will receive a message with a code from the delivery company. In a world where consumers want everything to happen swiftly and safely, the ability to adjust order delivery time to a customer's schedule may be a genuine benefit (Baig *et al*., 2020). Despite the benefits given, autonomous delivery robots have some limitations that must be addressed before they can be extensively employed. The first limitation for autonomous delivery robots is that delivery robots have a limited range (Jennings & Figliozzi, 2020). Second limitation, autonomous robots may also not be able to operate in crowded areas (Salvini *et al*., 2022). In addition, robots need human assistance to drop off freight (Boysen *et al*., 2018). These limitations make the adoption of ADRs incredibly low when compared to other nations. Apart from that, reviews on previous research also show that there are a limited number of studies focusing on autonomous delivery robot trends in Malaysia. Therefore, this research aims to identify the STEEPV factors that lead to autonomous robot adoption in the delivery industry as well as to explore the future trends of autonomous robot adoption for parcel delivery in the context of Malaysia.

2. Literature Review

2.1 Autonomous Delivery Robot

ADR is a self-driving ground vehicle that can deliver goods and parcels to the consumer doorstep (Chen *et al*., 2021). ADR look like little robots or like a mobile parcel locker and they drive at a speed of approximately 5-10 km/h sidewalks (Marsden *et al*., 2018). The deployment of ADRs technology in this emerging marketplace calls for collection and analysis of consumer preference data on ADR. Depending upon the range of operation, ADRs are classified into two types which are road-based ADRs and sidewalk-based ADRs (Jennings & Figliozzi, 2020).

2.2 Autonomous Robot Adoption in Parcel delivery

The introduction of ADR has revolutionized the delivery systems by giving cheaper cost and efficient delivery (Adjabu *et al*., 2014; Pani *et al*., 2020). This application brought a huge opportunity for expansion in the market for parcel delivery. There are several developed countries that have started to use ADR technology for distributing consignments or packages to consumers (Poikonen & Campbell, 2021).

2.3 Identifications of Issues and Drivers

STEEPV analysis is used to identify the key drivers and issues which are related to the implementation of autonomous robots for parcel delivery in Malaysia. The issues and key drivers are classified which are social, technological, economical, environmental, political and values. This will give a clear view of the issues and key drivers of the research.

2.4 Merging Issues and Drivers

A total number of eleven issues and drivers had been developed after the merging of key terms of issues and drivers which will be included in the questionnaires for the purpose of collecting data. Table with Merged Issues and Drivers shown in Table 1 below.

Table 1: Table with Merged Issues and Drivers

No.	Issues	Key Drivers
1.	Autonomous delivery robot can save time and cost due to practically to be implemented	Time and Cost Saving
2.	Autonomous delivery robot in urban and rural areas need a strong government policy to support the implemented	Strong Government Policy in Autonomous Robot Delivery
3.	sidewalk delivery robots have the potential to boost productivity and enabling consumers to have higher incomes to spend locally and will be push ADR developers to provide large- scale operation in Malaysia	Economic Growth and Market Demand
4.	Autonomous delivery robot is more conservation and sustainability to the environment because it can reduce fuel use	Environmentally Friendly
5.	The autonomous delivery robot is more secure because have anti thief and can be monitor through customer mobile phone	Safety
6.	Autonomous delivery robot is equipped with sensors and navigation technology that allow the robot to deliver parcel to the right customers.	Technology Advance
7.	Autonomous delivery robot is driverless so that customer can schedule the delivery time to get their parcel anytime	Convenience
8.	Utilizing of modern technology such as Autonomous delivery robot in parcel delivery enable customer demand to get their parcel on time and their expectation to get the parcel in shorter time.	Consumer Behavior
9.	Due to covid-19 pandemic, autonomous robots can meet the demand for contactless delivery.	Consumer Demand

10.	Using autonomous robots is safe as there is no human involvement in the delivery process.	No Human Involvement

3. Research Methodology

3.1 Research Design

This research will use the quantitative method to obtain the information and data in conducting this research. The data collection will be obtained from respondents and the literature review will be analyzed during this method. Those data obtained will be finalized and consistent with objectives of this study. There are three main types of research methodology which are quantitative, qualitative and mixed based methods (Leavy, 2022). In this research, both qualitative and quantitative approaches will be used to analyze and interpret data. Quantitative approach is particular in its surveying and analysis, as its share upon existing present theories. This research, adopting questionnaires in order to collect the data. The survey form which is in the form of a questionnaire was distributed to the public in Malaysia for answers. The respondent data helps to explore information about the future possibilities to meet the needs as well as opportunities for the future.

In the qualitative method, a foresight process will be used to identify key drivers that lead to autonomous robot adoption for parcel delivery in Malaysia as well as to explore the future trends of autonomous robot adoption for parcel delivery in Malaysia. The process consists of three phases, which are diagnosis, prognosis and prescription. In the diagnosis phase, horizon scanning and STEEPV which are social, technological, economic, environment, political and values methods will be used to identify issues and drivers that lead to autonomous robot adoption for parcel delivery in Malaysia. Second phase is the prognosis phase where an impact uncertainty analysis was used to identify the level of impact and uncertainty each driver obtained through STEEPV analysis. Lastly, the prescription involves a scenario analysis to identify four potential scenarios of future adoption of autonomous robot for parcel delivery in Malaysia. There are several important needs and issues that could affect the future usage of autonomous robots will be studied in this research.

3.2 Data Collection

The data collection of this research is composed of secondary data and primary data collection. The primary data were collected by questionnaires. The questionnaire will be given only to the customers that purchase through online shopping. While for secondary data, it will be collected through the analysis from several sources such as journals, articles, magazine, conference paper, websites, and thesis. The research focuses on autonomous robots for parcel delivery in Malaysia with the target population being customers who have experience delivery or post service in Malaysia. In this research, a convenience sampling technique was used. The questionnaires were distributed to 384 expected respondents in Malaysia to get feedback. The questionnaire involves 4 sections which are Section A, Section B, Section C, and Section D. Section A represents demographic information which is the information of respondents and their background of. Thus, Section B asks respondents to choose or rank the level of importance of factors or drivers towards adoption of autonomous delivery robots for parcel delivery in Malaysia. Likert scale is used to rank the important drivers for this part onwards. Next, section C which is with the degree of impact of factors or drivers towards adoption of autonomous robots for parcel delivery in Malaysia. Lastly, section D deals with the degree of uncertainty of each factor or drivers towards adoption of autonomous delivery robots for parcel delivery in Malaysia. For this research, primary data used as the primary source and secondary data as the second source to conduct the research about the issues of autonomous delivery robot adoption for parcel delivery in Malaysia.

3.3 Data Analysis

The purpose of data analysis is to obtain or collect usable and useful information. Data analysis has to be done carefully in order to avoid any unwanted mistakes. It is important to understand the need

for analyzed data to ensure the data was analyzed correctly.

(a) Impact-uncertainty analysis

The results of the survey will be analyzed using the Statistical Package for the Social Sciences once it has been distributed (SPSS). Statistical analysis helps in identifying the important drivers that respondents evaluate. In an impact-uncertainty analysis, the key drivers listed will be placed and tested. The key drivers with highest degree of impact and uncertainty were selected.

(b) Scenario analysis

Scenario analysis is used to explore possible futures. The role of scenario analysis views the system operating under uncertainty and it will be generating the recommendation towards the system. In this research, the top two key drivers were selected to build four alternatives scenarios. It reflects the future trend and potential consequences of implementing autonomous robots for parcel delivery in Malaysia. The recommendations were proposed for sustainability of autonomous robots for parcel delivery in Malaysia regarding the positive and negative consequences.

4. Results and Discussion

4.1 Reliability for Pilot Test

Pilot study is small versions of planned investigations and has been conducted to test the feasibility of the questionnaire in research (Eldridge *et al*., 2016). By doing pilot study, it can increase the chances of getting clearer findings as well as eliminate questions that are likely to mislead in the main research (Thabane *et al*., 2010). Thus, copies of 30 questionnaires have been purposely distributed to 30 selected respondents for this pilot study and the result of the pilot study questionnaire was done using SPSS.

Table 2: Result of Pilot Test

Part	Drivers	Cronbach's alpha	No of items
B	Importance	0.986	10
C	Impact	0.986	10
D	Uncertainty	0.985	10

Table 2 shows the result of the pilot test that was carried out for this research. About 30 sets of questionnaires were distributed and collected in the pilot study. The question for this pilot study were arranged into 3 sections which were Part B, Part C and Part D. Part B was the level of importance regarding the adoption of autonomous robot for parcel delivery in Malaysia, Part C was the level of impact adoption of autonomous robot for parcel delivery in Malaysia and the Part C was the level of uncertainty of adoption of autonomous robot for parcel delivery in Malaysia. Every part contains 10 questions. Cronbach's Alpha for 3 parts was acceptable because higher than 0.70. The value of Cronbach's Alpha for Part B and Part C was 0.986 which indicated the good level of reliability in conducted research. Finally, the value of Cronbach's alpha for Part D was 0.985 which indicated the same level with Part B and C which is good for reliability in conducted research.

4.2. Reliability for Actual Study

Actual study will be conducted once the result of pilot study is valid and reliable. For the data collection, about 384 copies of questionnaires have been distributed. Table 3 shows the result of a reliability test conducted for the actual study for each variable. The respondents were 162 consumers in Malaysia.

Table 3: Result of Actual Study

Part	Drivers	Cronbach's alpha	No. of Item
B	Importance	0.991	10
C	Impact	0.994	10
D	Uncertainty	0.992	10

From the table, it shows the value of all Cronbach' alpha for all the variables are above the acceptance level which is more than 0.7. The result for importance, impact, and uncertainty are 0.991, 0.994, and 0.992 respectively. The value of Cronbach's alpha should be above 0.7 or a minimum acceptable level of reliability would be 0.7. Based on the result, it shows each of the variables has a reliable value based on Cronbach's Alpha.

4.3 Response Rate

A total of 384 questionnaire forms had been distributed to the respondents but only 162 respondents had given their responses. Based on that, the turnover rate of this study is 42.19 percent. Table 4 below shows the response rate from the questionnaire answered.

Table 4: Response Rate

Sample Size	Total Respondents	Response Rate (%)
384	162	42.19

4.4 Demographic Profile

Table 5 summarizes the respondent's demographic profile. Majority of respondents were female as compared to male respondents. There is a slight balance in the number of respondents who live in urban areas and suburban areas. Almost half of the respondents were Malay. Majority of them use J&T as their courier for parcel delivery. Almost half of respondents are between 18-25 years old. This is because those of this age tend to buy online and use conventional methods in daily life.

Table 5: Summary of respondent's demographic

Item	Frequency	Percentage (%)
Gender		
Male	45	27.78
Female	117	72.22
Total	162	100
Races		
Malay	139	85.80
Chinese	15	9.26
Indian	3	1.85
Others	5	3.09

Total	162	100
	Age	
18-25 years old	151	93.22
26-30 years old	7	4.32
31-35 years old	2	1.23
36-45 years old	2	1.23
Total	162	100
	Area You Live	
Urban	75	46.30
Sub-Urban	65	40.10
Rural	22	13.60
Total	162	100
	Courier services commonly use	
J&T	129	79.62
DHL	12	7.41
GDEX	6	3.70
Poslaju	11	6.80
Others	4	2.47

4.5 Mean of Drivers on Importance

This section will discuss the descriptive analysis of important drivers. With this analysis, it will conduct to know the importance of each of the statements towards Autonomous Robot technology. Likert scale has been used to rank the drivers where respondents have been asked to choose the answer according to the scale provided.

Table 6: Mean of Drivers on Importance

No	Drivers	Mean
1	Using autonomous robots for parcel delivery can save time as no traffic jams are involved.	2.09
2	Using autonomous robots is safe as there is no human involvement in the delivery process.	2.20
3	Using autonomous robots to deliver packages can save money.	2.26
4	Using autonomous robots to deliver packages is beneficial to the environment since it reduces carbon dioxide emissions.	2.08
5	Using autonomous robots can save the environment as it is more environmentally friendly.	2.04
6	Using autonomous robots for parcel delivery can prevent theft as it has a robust detecting mechanism.	2.10
7	Using autonomous robots is more convenient as the parcel will be delivered in front of the customer door.	2.04

8	Using autonomous robots can improve the quality of life as careful placement of technological support is provided.	1.97
9	Using an autonomous robot is safer for personal delivery since customers are able to choose their arrival time slot.	1.96
10	Due to covid-19 pandemic, autonomous robots can meet the demand for contactless delivery.	1.59

Based on Table 6, it shows the mean of the level of importance regarding the adoption of autonomous robots for parcel delivery in Malaysia. The highest factor for the level of importance regarding adoption of autonomous robots for parcel delivery in Malaysia is "*Using autonomous robots to deliver packages can save money*" with the mean 2.26. The lowest mean recorded was 1.59 that is "*Due to covid-19 pandemic, autonomous robots can meet the demand for contactless delivery*".

4.6 Mean of Drivers on Level of Impact

Impact analysis was conducted to know if the drivers may cause an impact towards the intention to adopt autonomous robots for parcel delivery in Malaysia. Impact drivers used Likert scale and classified into 5 scales which are very low, low, moderate, high, and very high. Table 10 shows mean values for each of the drivers.

Table 7: Mean of Drivers on Level of Impact

No	Drivers	Mean
1	Using autonomous robots for parcel delivery can save time as no traffic jams are involved.	1.98
2	Using autonomous robots is safe as there is no human involvement in the delivery processes.	2.11
3	Using autonomous robots to deliver packages can save money.	2.49
4	Using autonomous robots to deliver packages is beneficial to the environment since it reduces carbon dioxide emissions.	2.10
5	Using autonomous robots can save the environment as it is more environmentally friendly.	2.09
6	Using autonomous robots for parcel delivery can prevent theft as it has a robust detecting mechanism.	2.27
7	Using autonomous robots is more convenient as the parcel will be delivered in front of the customer door.	2.06
8	Using autonomous robots can improve the quality of life as careful placement of technological support is provided.	2.19
9	Using an autonomous robot is safer for personal delivery since customers are able to choose their arrival time slot.	2.16
10	Due to covid-19 pandemic, autonomous robots can meet the demand for contactless delivery.	1.79

From Table 7, the highest mean is "*Using autonomous robots to deliver packages can save money*" with the mean 2.49. The lowest mean recorded was 1.79 that is "*Due to covid-19 pandemic, autonomous robots can meet the demand for contactless delivery*".

4.7 Mean of Drivers on Level of Uncertainty

The progress of analysis is followed by analyzing the level of uncertainty for each driver and their

mean value. Table 8 indicates the mean value according to the rating scale for each level of uncertainty by respondents through the questionnaire. The highest mean value shows the most uncertainty for the drivers. All mean values for the level of uncertainty will be brought forward to construct impact-uncertainty analysis.

Table 8: Mean of Drivers on Level of Uncertainty

No	Drivers	Mean
1	Using autonomous robots for parcel delivery can save time as no traffic jams are involved.	2.25
2	Using autonomous robots is safe as there is no human involvement in the delivery process.	2.31
3	Using autonomous robots to deliver packages can save money.	2.44
4	Using autonomous robots to deliver packages is beneficial to the environment since it reduces carbon dioxide emissions.	2.36
5	Using autonomous robots can save the environment as it is more environmentally friendly.	2.35
6	Using autonomous robots for parcel delivery can prevent theft as it has a robust detecting mechanism.	2.62

Table 8 illustrates the comparison of mean values for impact and uncertainty. It shows the mean value for each driver in the impact-uncertainty analysis. The main purpose of the analysis is to determine the highest outcome in terms of impact and uncertainty. Figure 4.1 shows the top two coordinates with high impact and uncertainty were chosen, which is D3 (2.617, 2.494) and D6 (2.444, 2.272). D3 has the highest level of impact and D6 has the highest level of uncertainty for the future of autonomous robot adoption in Malaysia. Two top drivers which are using autonomous robots to deliver packages can save money and using autonomous robots for parcel delivery can prevent theft as it has a robust detecting mechanism were chosen to generate the future scenario.

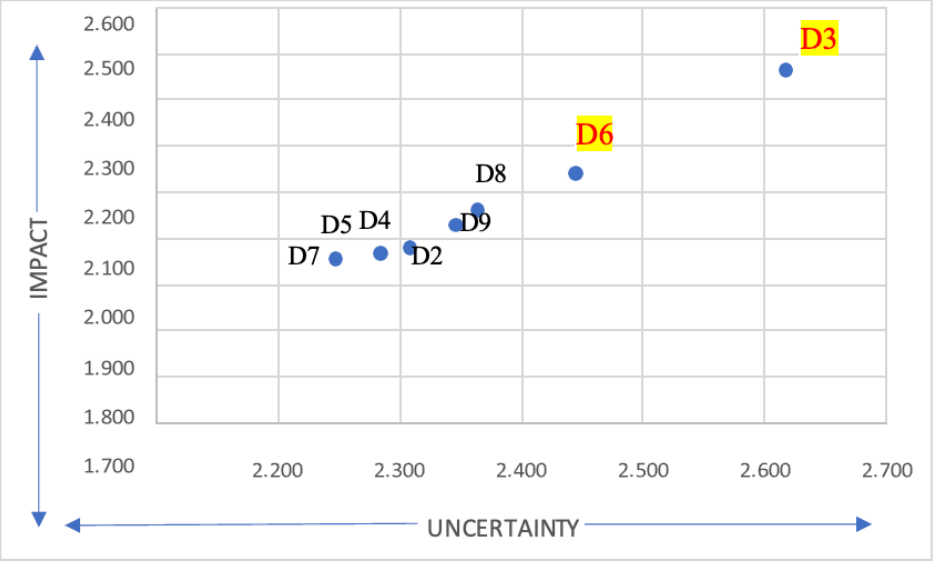

Figure 1: Impact-Uncertainty Analysis

Based on Figure 4.6, driver D3 with coordinates (2.617, 2.494) and D6 (2.444, 2.272) are selected for the highest level of impact-uncertainty analysis. These two drivers represent the following questions

which are “Using autonomous robots to deliver packages can save money” and “Using autonomous robots for parcel delivery can prevent theft as it has a robust detecting mechanism”. From the result, this study has selected drivers that are related with interaction and provide enjoyment and pleasant feeling as the top drivers that lead to the adoption of autonomous robots for parcel delivery in Malaysia.

5 Results and Discussions

5.1 First Research Objective

The first objective of this research is to determine the key drivers that lead to autonomous robot adoption for parcel delivery in Malaysia. Based on issues derived from the literature, we then classify it into STEEPV factor. Identifying the STEEPV factors is important to determine factors that areimportant for future adoption of autonomous robots for parcel delivery. Next, the process of constructing an impact-uncertainty analysis based on two primary drivers of STEEPV factors.

5.2 Second Research Objective

The objective of this research is to examine the future trend of ADR for parcel delivery in Malaysia. To accomplish this objective, researchers need to identify the trends that are becoming the pushing factor for the future development of autonomous robots. Based on scenarios constructed, it will give insights of the future of drone technology in the postal and courier industry in the next 10 years. The four distinct possible scenarios have been illustrated in Figure 2. The scenarios of new advancement, lost trust in autonomous delivery robot technology, security and privacy problems and high demand for autonomous robot technology have been further demonstrated and discussed the possible implications. The scenarios will be discussed despite the outcome of positive or negative in the time horizon forecasted.

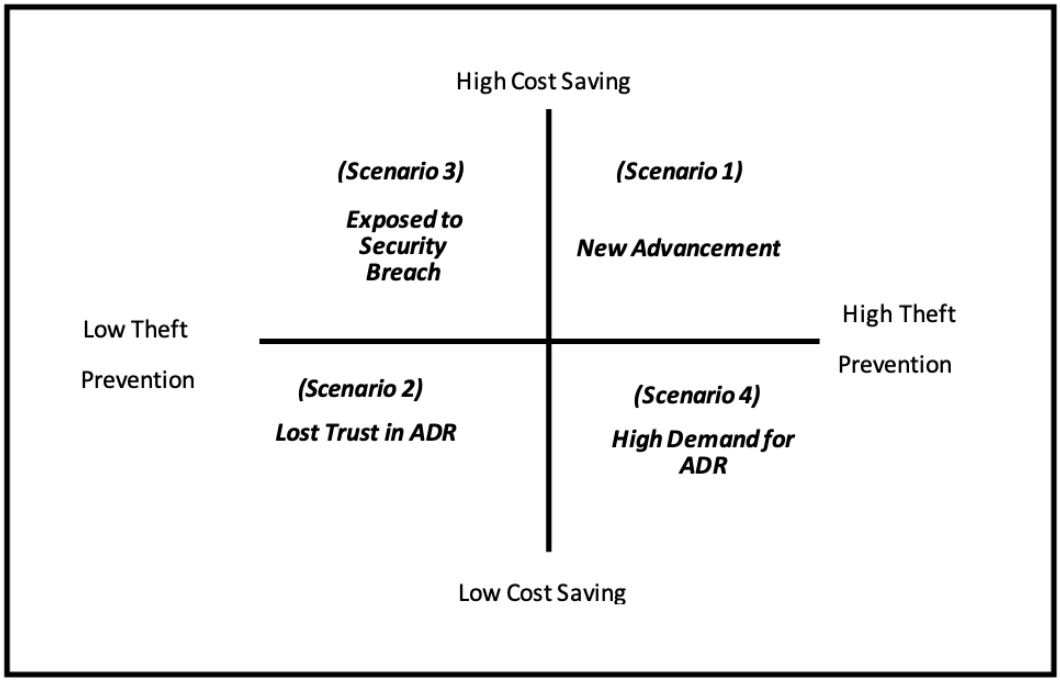

Figure 2: Scenario Building

(a) New advancement

Scenario 1 illustrates high cost saving with high theft prevention. This is the best scenario to be achieved as it will increase the adoption of autonomous robots for parcel delivery in Malaysia. This

new advancement will bring new improvements in terms of delivery method, speed and accessibility. The advancement of autonomous robots technology can improve the delivery services and optimal the consumers' satisfaction by providing faster delivery services. It is important a new service technology in the postal and courier industry is important to facilitate the performance and utilizing the space and time, result directly improves the efficiency of operation (Vadivel *et al*., 2022). Further, the use of autonomous robot for parcel delivery services could prevent theft as it has a robust detecting mechanism. In addition, autonomous delivery robots are relatively low-cost. Since delivery robots are earthbound, the technology required to monitor and operate them can be less sophisticated than drones, thus reducing costs (Boysen *et al*., 2021). As a result, autonomous robot technology is a new advancement in logistics services that may cost saving and theft prevention.

From the respondents' perspective, the most important driver that influences the adoption of autonomous robots for parcel delivery in Malaysia is the theft prevention system. This scenario is the ideal scenario for the adoption of the autonomous robot for parcel delivery which is more efficient and effective compared to traditional truck delivery with a high cost saving and high theft prevention system. Autonomous robot is a great technology for deliveries that can be monitored by the consumers with their mobile phones, and the locked loading space can be opened with it (Boysen *et al*., 2021). For instance, delivery companies and policymakers are interested in autonomous robots because of their potential to lower costs (Figliozzi, 2020). As a result, delivery businesses are expected to strive to use this cost-cutting technology in order to fulfill rising ecommerce demands (Figliozzi, 2020).

(b) Lost trust in autonomous robot technology

The lost trust in ADR in Scenario 2 represents the low cost saving and low theft prevention. This is the worst case scenario for ADR adoption because society does not trust that ADR can function in the postal and courier business since they are regarded to be low-cost and have a weak theft protection system. If autonomous robots have a low theft prevention system, consumers and delivery companies will be hesitant to embrace or accept this technology since it is fraught with uncertainty. As a result, society will lose faith in ADR, and the postal and courier industries will refuse to accept them. This situation is possible because society believes ADR technology would not only harm their interests due to low-cost savings, but also because the theft protection system will be inadequate.

(c) Cyber security risk

In scenario 3, the researcher pointed out autonomous robots will be exposed to cyber security due to a low theft prevention system. In other words, hackers can easily hack the system and g*et al*l the information provided about the consumers such as their general data like private pictures, user routine information and their address. The ineffective encryption mechanism used in connection methods also allows anybody to gain access to the data and collect crucial information required to carry out an attack or do harm (Qadir & Varol, 2019). In some circumstances, where there is no authentication, it is simple to hack the autonomous robot and disrupt its usual operation. Despite the high cost of the autonomous robot, most delivery companies will not deploy it owing to its low theft prevention. This is due to consumer concern about the high risk of products being stolen. Even though autonomous robots have low theft prevention, autonomous robots have attracted the interest of delivery companies and policymakers due to their potential to reduce costs and boost urban freight efficiency (Figliozzi, 2020). According to a recent report by McKinsey (2019), autonomous robots might save up to 40% on last-mile deliveries as compared to human delivery, especially in rural and low-population areas (Alfandari *et al*., 2022). Therefore, this action may contribute to the advantages of automating these deliveries: robots can save many workers time and will eventually save money for the delivery company (Abdullah, 2012).

(d) High demand autonomous robot

Lastly, this scenario 4 was granted high theft prevention and low cost saving that lead to the demand for autonomous robot technology is high. Generally, high theft prevention in autonomous robots will improve safety for parcel delivery in high-risk population areas and experience in future, but with low cost saving will cause various problems especially involving the company profit and

expenditure. This scenario is good for delivery companies to adopt this technology but must be concerned about the cost for autonomous robots. With the outbreak of COVID- 19, the demand for contactless delivery has expanded exponentially, where many autonomous delivery robot companies are seeing a massive opportunity to grow amid the coronavirus outbreak that has millions of people staying home (Xiang *et al*., 2021)Even though autonomous robots are low-cost, the delivery company will use it for parcel delivery to consumers since the demand is high. In addition, consumers are also willing to adapt and use autonomous robots since the autonomous theft prevention system is high.

In conclusion, this research is carried out to identify the issues and STEEPV factors as well as the future trends of autonomous robot adoption for parcel delivery in Malaysia. Autonomous robot potential capabilities and possess huge opportunities in various industries, especially in the postal and courier industry. A foresight study on the future trend on adopting the autonomous robot for parcel delivery in Malaysia, various research methodologies have been applied such as STEEPV analysis, SPSS statistical analysis, impact-uncertainty analysis and lastly scenario building analysis in order to identify the future key drivers and the impact and uncertainty which corresponding to future adoption on autonomous robot for parcel delivery in Malaysia. The objective of this research has been successfully achieved by obtaining the top two drivers and generating four alternative future scenarios which described how autonomous robot cost saving and high theft prevention will impact and improve the performance of the postal and courier industry in the future for parcel delivery.

Acknowledgement

The authors would like to thank the Technology and Innovation Management Focus Group and the Faculty of Technology Management and Business, Universiti Tun Hussein Onn Malaysia for its support.

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