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A FORESIGHT STUDY OF ARTIFICIAL INTELLIGENCE IN THE AGRICULTURE SECTOR IN MALAYSIA

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Abstract
Agriculture is one of important sector in Malaysia which contribute to the national GDP and provide employment for the society. Agriculture sector also has become the focus of the rural development programs. However, economic diversification has recently shifted the focus from agriculture to manufacturing and services sector. A comprehensive reform is needed by adopting smart farming to revitalize Malaysia's agriculture sector. Therefore, the aim of the research is to identify the issues, drivers and future trends of Artificial Intelligence (AI) in the agriculture sector in Malaysia. This research used foresight tool such as STEEPV to identify the issues and drivers. Questionnaires were distributed to the respondents who were farmers in Johor. Based on the data collection, 150 out of 380 respondents had answered the questionnaire. The findings showed the technological factor has the highest frequency compare to other five factors. A total nine major issues and drivers were also identified. From the impact-uncertainty analysis, the top two drivers which were replacement of employees and productivity enhancement and optimize economic had chosen. The top two drivers were used to develop scenario analysis. The scenario analysis included market expand, shortage of manpower, wastage of resources and impede development. This research gives benefits to agriculture sector, farmers and the consumers. This research also gives a foresight of the trends that may happen in the future. This research can helps to increase the quality of life, develop technologies and innovation, growth of economic and environmental friendly.

Keywords--- Agriculture, Artificial Intelligence, Foresight

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INTRODUCTION

Artificial Intelligence (AI) is defined as computer science branch addressing the simulation of smart behavior in computers. AI is also the ability of a machine to mimic intelligent human behavior (Artificial Intelligence, 2019). The history of AI was begun at Dartmouth College in Hanover, New Hampshire during the summer of 1956. A group of researchers were invited by John McCarthy in a wide range of advanced research topics like automatic computers, randomness and creativity, neuron nets and so on and first coined the term artificial intelligence in 1956.Meanwhile, agriculture is defined as the art and science of soil cultivation, crop cultivation and livestock rearing. It includes preparing plant and animal merchandise for use and distributing them to the markets (Sprout, Costa, Hunt, Hall, Rutledge, Ramroop, Boudreau, McDaniel & Teng, 2011). Agriculture sector plays a strategic role in Malaysia economic growth as it contributes to the Gross Domestic Product (GDP) and provides employment to the society (DOSM, 2018).

There are four issues that motivate this study to be conducted. Firstly, agricultural is highly susceptible to disease, change of climate and pest infestation which will affect the agriculture products. The climatic change, disease outbreaks and the infestation of pets can further cause the poor productivity and low quality of agricultural products. According to Thakur & Gyanendra (2018), the effects of climate change on plant and breeding behavior of animals has discovered. Crop yield losses in the entire world and the food insecurity in the developing countries are caused by insect pests (Zhang, Kato, Bianchi, Bhandary, Gort& van der Wer, 2018).Secondly, the issues of increasing labor shortage in large scale agriculture. The labor market is not absolutely competitive when labor shortages in agriculture (Cassey, Lee, Sage & Tozer, 2018). Aging of labor in agriculture does not contribute to the overall development of agriculture production. People are increasingly concerned about the production of agriculture land that was affected by the aging of agriculture labor and whether aging farmers will continue to work in agriculture production (Guo, Wen & Zhu, 2015). The youth usually refuse to involve in the agriculture sector due to its low social position which is considered as filthy work, the low and slow rewards from agriculture and others (Ogbeide, Ele&Ikheloa, 2015).

Thirdly, the issue of consumer perception towards agriculture products. Most of the time the consumers always emphasize on the quality of the food which are safe to be consumed (Sadílek, 2019).Lastly, the safety and health of the farmers are affected in agriculture. The farmers sometimes will face grain bin injuries and the most common one is suffocation. According to Szeszenia-Dabrowska, Swiatkowska&Wilczynska (2016), farming is a part of economic sectors with ahigh risk of exposure to factors or conditions of work that affect the health of farmers. Negative health effects due to exposure of pesticides in their daily work, which consequently lead to respiratory disease (Dhananjayan& Ravichandran, 2018).

Based on these four issues, it is a need to study about the implementation of Artificial Intelligence (AI) in the agriculture sector, due to AI can track and predict several environment impacts like change of climate on crop yield. AI also helps to increase the productivity and quality of agricultural products. Hence, this study aims to identify the issues and drivers of AI in agriculture sector in Malaysia. Furthermore, this study also aims toexplore future trends of AI in agriculture sector in Malaysia.

LITERATURE REVIEW

Identification of Issues and Drivers

The issues and drivers were classified into Social, Technological, Economic, Environmental, Political and Values (STEEPV) as depicted in Table 1.

Table 1. Key Terms of Issues and Drivers

Social	Technological	Economic	Environmental	Political	Values
1. Global population is predicted to exceed to exceed 9 billion.	1. Expert system and software can demarcate management areas.	1. Enhancing technical and economic efficiency.	1. Reducing the negative environmental impact of agriculture.	1. Agile governance as adaptive, comprehensive, human-centred and sustainable policy-making.	1. Raising several ethical issues and increases concern about the effect of AI technologies.
2. AI technologies more profound affected our life.	2. Effective use of digital technologies.	2. Allows efficient overall resource utilization.	2. Environmental impact and the excess pesticide residue can be reduced.	2. Government helplines to resolve the problems faced by farmers.	2. Ethical and responsible use of AI.
3. Safety to reduce the negative impacts.	3. Technology for precision on weed management was utilizing AI.	3. More precise and cost-efficient approach was achieved.	3. Reducing waste across the food supply chain.	3. Government declared a £90m ISCF Wave 2 investment for supporting innovation.	3. Addressing the impact and ethical issues of AI.
4. Global population is expected to achieve 8.5 billion people.	4. Internet of Things (IoT) deployment in tomato greenhouse.	4. Reducing of operational costs and increase the yields of crops.	4. Farms become more efficient, secure, profitable and environmental friendly.	4. Government support the development of farm.	
5. Attracting skilled workers and graduates to the industry.	5. Sensory data collected by robotic platform.	5. Mobiles computing, mobile phones and embedded processors integrated into many platforms at low cost.	5. Without environmental problem or side effect.	5. Policies that could be framed by the government through farmer's crop practices.	
6. Global population is anticipated to increase nearly 10 billion people.	6. AI-powered chatbots provide answers and suggestion.	6. Decrease the planting cost by 85%.	6. Sustainability environmental performance in every season.	6. Government and industry leaders action in AI applications.	
7. Surging population of people.	7. Using new technology to solve the problems.	7. Reducing the complexity and costs in gluten-containing grains.	7. Decarbonize power grid, expand renewable energy use and improve energy efficiency.	7. Government policies and institution affected the interplay between AI and self-employment.	
8. Employment is reduced and higher rates of unemployment.	8. Using AI with robotic machines to kill pests.	8. Increase productivity, optimize economic benefits and project the agricultural work.	8. Precision agriculture minimize environmental pollution.	8. Government has supported the basic research on AI.	
9. Fast-growing population and urbanization.	9. Proposing methods of computer vision with AI.	9. Addressing adverse weather conditions, productivity gains and crop yield management.	9. Reduce the residues of herbicide in water, food crops and the environment.		
10. Implementing work safety and health information of aging farmer.	10. Automated fruit grading system identify the fruits based on colour.	10. Enhance the management of input variables and increased the quality of products.			
11. Replacement employees in the process.	11. AI is mainly a productivity enabler.	11. Less resource and time to market.			
12. Employment opportunities in technology are	12. Artificial neural network can semi-	12. Increasing the agricultural resource			

necessary.	automated biological object identification.	efficiency and decrease using the water, pesticides and fertilizers.			
13. AI and robotics replace workers.	13. Machine learning has developed in conjunction with massive data technologies and superior computing.	13. Increasing the productivity of agriculture.			
14. Maximizing the societal advantage.	14. Rowbot started pairing software system that gathers data with robotics.	14. Improving the productivity by automating.			
	15. Integration of expert an expert system with databases is required.	15. Increasing the production, quality and food security in agriculture.			
	16. Sensors can provide AI with the data necessary.	16. Minimize the resource use, maximize the net profit and control the greenhouse crop growing remotely.			
	17. Controlling strategies is using AI techniques.	17. Decrease the cost and lower the power consumption.			
	18. AI and big data were used to expand genetic engineering fields.	18. Impacting the income shares and economic growth.			
	19. Automated work to identify the weed species.	19. Bring efficiency and productivity to new levels.			
	20. AI may serve as a platform in many service sectors.	20. Contribute to sustainable growth of economy.			
	21. Combination with the latest AI technology in the experiment.				
	22. Integrating sensor technology and AI into agricultural modernization.				
	23. Best platform for training AI networks seem like Graphics processing units (GPU).				
	24. High degree of integration and cross-fertilization between AI and other fields.				
14	**24**	**20**	**9**	**8**	**3**
TOTAL = 78					

Merging of Issues and Drivers

A total of 78 issues and drivers that related to the AI in the agriculture sector in Malaysia has been merged together. After merging all the issues and drivers, nine key term were identified as reported in Table 2.

Table 2. Merging of All Related Issues and Drivers

No.	Key Term
1.	Advanced in living standard
2.	Replacement of employees
3.	Safety and health of farmer and consumer
4.	Technology advancement
5.	Resource efficiency and decrease cost
6.	Productivity enhancement and optimize economic
7.	Reducing the environment impact
8.	Government policy
9.	Ethical issues

METHODOLOGY

The issues, drivers, challenges and future scenarios of Artificial Intelligence (AI) in the agriculture sector were analyzed by using qualitative and quantitative methods. The STEEPV analysis and questionnaire were used in order to collect and analyze data.The research is focusing on AI in agriculture sector in Malaysia with the target population is the farmers. In total, there are 40,000 farmers located in Johor, Malaysia. These farmers were individual who understand and familiar with the condition of agriculture sector in Malaysia and can provide more accurate information to the research. In this research, convenience sampling techniques was used. The questionnaires were distributed to 380 farmers in Johor to get feedback from the respondents. The questionnaire provides an objective means of gathering information on the perceptions, attitudes, behavior, beliefs and attitudes of individuals to a particular component (Boynton & Greenhalgh, 2004). Section A represents demographic information which is the information of respondents and their background. The questions in Section A include gender, age, race and others. Section B asks respondent to choose or rank that the level of importance which related using AI in agriculture sector, while Section C and D provide statements regarding level of future impact and uncertainty respectively. Five-point likert scale was used in these three sections.

Data collection is the process of gathering information from all relevant sources to find answers to research questions, testing hypotheses and evaluating results. There are two categories of data collection methods which are primary data collection and secondary data collection. Primary data is data that collected by researcher from first-hand sources using questionnaire, interview, experiment and others. Questions in the questionnaire are set according to the research objective and then distribute out. Data collected from questionnaire not only can collect the data in a short time, but also easier to arrange and interpret. Secondary data is data that has been published on books, newspapers, magazines, journals and online portals. Every research area will have large amount of data available. Secondary data plays an important role to increase the level of research effectiveness and reliability. Secondary data collection used in this research is collecting data from article, journal, newspapers and books to complete this research and STEEPV analysis.

Descriptive analysis involves transforming raw data into a form that eases the interpretation and understanding of the reader in rearranging, ordering, and manipulating data to generate descriptive information (Zikmund, 1997). The data collected by the questionnaire were analyzed in terms of mean, percentage and frequencies. Besides, Impact-Uncertainty Analysis ranked the drivers from the STEEPV analysis according to their importance, impact and uncertainty. Impact means the effect by the driver that forming the future of an area. If the driver in lower uncertainty, it represents the confidently aware that happen. It shows not certain that will happen if higher uncertainty. Lastly, scenario analysis was used to identify the future implications such as future events, issues, trends, strategy and futures-related development. Four different alternatives scenarios has been generated reflecting the future consequences of events and trend of AI in agriculture sector as depicted in Figure 1.

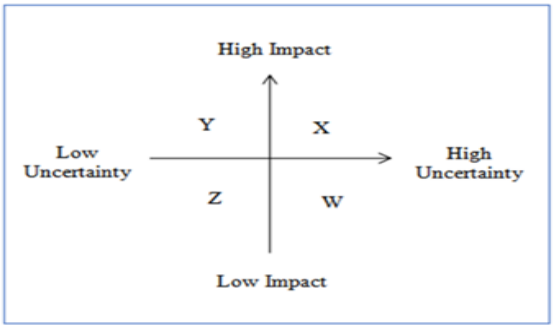

Figure 1. Scenario Analysis

DATA ANALYSIS AND FINDINGS

Demographic Information Analysis

In this section, demographic information of the respondents were analyzed and discussed. In the questionnaire, demographic information was Part A which included the gender, age, races and work experience of respondents.

Table 3. Summary for the Demographic Information Analysis

No.	Demographic Information		Frequency (*f*)	Percentage (%)
1.	Gender	Male	86	57.3
		Female	64	42.7
		Total	**150**	**100.0**
2.	Age	30 years and below	7	4.7
		31 - 40	17	11.3
		41 - 50	44	29.3
		51 - 60	53	35.3
		61 - 70	20	13.3
		70 years and above	9	6.0
		Total	**150**	**100.0**
3.	Race	Malay	76	50.7
		Chinese	58	38.7
		Indian	6	10.7
		Others	-	-
		Total	**150**	**100.0**
4.	Work experience	Less than 5 years	4	2.7
		6 years – 10 years	23	15.3
		11 years – 15 years	54	36.0
		16 years and above	69	46.0
		Total	**150**	**100.0**

Table 3 shows the distribution of genderrespondents. 86 (57.3%) respondents were male and 64 (42.7%) respondents were female. Among all, male respondents were higher compared to female respondents.The majority of the respondents which were 53 respondents fall in the age of 51 - 60 years old which consists of 35.3%. The second highest category which was 44 respondents fall in the age of 41 - 50 years old

which consists of 29.3%. After that, there were 20 respondents with the age of 61 - 70 years old which consists of 13.3%, while 17 respondents with the age of 31 - 40 years old which consists of 11.3% and 9 respondents with the age of 70 years old and above which consists of 6.0%. Finally, 7 respondents with the age of 30 years old and below which consists of 4.7% were the lowest category.There are four categories of race involved which were Malay, Chinese, Indian and Others. Most respondents were dominated by Malay respondents (50.7%). There were 58 Chinese respondents with the percentage of 38.7%. The lowest were Indian respondents with only10.7%. In this research, there are no other race represented by the respondents. With regards to work experience, the highest frequency and percentage was represented by the work experience of 16 years and above with 69 respondents and 46.0%. The second highest frequency and percentage represented by the work experience of 11 years - 15 years with 54 respondents and 36.0%. For the work experience of 6 years - 10 years, there were 23 respondents (15.3%). Finally, the lowest frequency of work experience was less than 5 years with only 4 respondents (2.7%).

Descriptive Analysis

Analysis of Statement Based on its Importance

Respondents were required to vote statements in Part B of the questionnaire which was the importance regarding AI in the agriculture sector in Malaysia. The importance levels includes 1 - Very Unimportant, 2 - Unimportant, 3 - Undecided, 4 - Important and 5 - Very Important were stated in Table 4. It shows the mean index average used in the research which was proposed by Abd Majid & Mc Caffer (1997).

Table 4. Scale and Mean Index Average Based on Importance level

Scale	Mean Index Average
1 - Very Unimportant	0.00 ≤ mean < 1.50
2 - Unimportant	1.50 < mean ≤ 2.50
3 - Undecided	2.50 < mean ≤ 3.50
4 - Important	3.50 < mean ≤ 4.50
5 - Very Important	4.50 < mean ≤ 5.00

The data was analyzed in terms of mean using the SPSS software after collecting data. Table 5 illustrates the mean value of drivers based on importance level.

Table 5. Mean of Drivers on Importance

No.	Issues and Drivers	Mean
1	Advanced in living standard	3.79
2	Replacement of employees	3.76
3	Safety and health of farmer and consumer	3.81
4	Technology advancement	3.96
5	Resource efficiency and decrease cost	3.76
6	Productivity enhancement and optimize economic	3.77
7	Reducing the environment impact	3.61
8	Government policy	3.69
9	Ethical issues	3.20

According to the Table 5, technology advancement had the highest mean value which was 3.96 compared to other factors. The result shows that most respondents agreed with the statement of "technology advancement" was important about AI in the agriculture sector. The statement of "safety and health of farmer and consumer" is the second highest mean value (3.81). While, the third highest mean value (3.79) was "advanced in living standard". Both of these statements also important on AI in the agriculture sector. However, ethical issues with the mean of 3.20 was the lowest mean value. Respondents agree with the statement was undecided regarding AI in the agriculture sector.

Analysis of Statement Based on its Impact

The impact regarding AI in the agriculture sector in Malaysia was given in Part C of the questionnaire which need the respondents to vote. Table 6 tabulates the impact scale and the mean index average. Impact scale consist of 1 - No Impact, 2 - Slight Impact, 3 - Neutral, 4 - Considerable impact and 5 - Great Impact.

Table 6. Scale and Mean Index Average Based on Impact level

Scale	Mean Index Average
1 - No Impact	0.00 ≤ mean < 1.50
2 - Slight Impact	1.50 < mean ≤ 2.50
3 - Neutral	2.50 < mean ≤ 3.50
4 - Considerable impact	3.50 < mean ≤ 4.50
5 - Great Impact	4.50 < mean ≤ 5.00

The data collected was analyzed in terms of mean by using the SPSS software. Table 7 illustrates the mean value of drivers based on impact level.

Table 7. Mean of Drivers on Impact

No.	Issues and Drivers	Mean
1	Advanced in living standard	3.69
2	Replacement of employees	3.83
3	Safety and health of farmer and consumer	3.74
4	Technology advancement	4.04
5	Resource efficiency and decrease cost	3.82
6	Productivity enhancement and optimize economic	3.83
7	Reducing the environment impact	3.59
8	Government policy	3.67
9	Ethical issues	3.23

Based on the Table 7, the highest mean of drivers was technology advancement which has the mean of 4.04. Most of the respondents agreed with the statement was considerable impact to use AI in the agriculture sector. The statements of "replacement of employees" and "productivity enhancement and optimize economic" have the same mean value which was 3.83. Both were the second highest mean value that considerable impact. AI in the agriculture sector. Respondents also agreed with the statement of "resource efficiency and decrease cost" regarding AI in the agriculture sector. As this statement was the third highest mean value (3.82) which considerable impact AI in agriculture sector. The lowest mean of drivers was ethical issues which has the mean of 3.23 give neutral to use AI in the agriculture sector.

Analysis of Statement Based on its Uncertainty

Part D in the questionnaire required respondents to vote statements which were the uncertainty regarding AI in the agriculture sector in Malaysia. Table 8 explains the uncertainty levels and the mean index average which was proposed by Abd Majid & Mc Caffer (1997). The uncertainty level includes 1 - Very Low Uncertainty, 2 - Low Uncertainty, 3 - Neutral, 4 - High Uncertainty and 5 - Very High Uncertainty.

Table 8. Scale and Mean Index Average Based on Uncertainty level

Scale	Mean Index Average
1 - Very Low Uncertainty	0.00 ≤ mean < 1.50
2 - Low Uncertainty	1.50 < mean ≤ 2.50
3 - Neutral	2.50 < mean ≤ 3.50
4 - High Uncertainty	3.50 < mean ≤ 4.50
5 - Very High Uncertainty	4.50 < mean ≤ 5.00

After collecting data, it analyzed using SPSS software in terms of mean. Table 9 shows the mean value of drivers based on uncertainty level.

Table 9. Mean of Drivers on Uncertainty

No.	Issues and Drivers	Mean
1	Advanced in living standard	3.67
2	Replacement of employees	3.77
3	Safety and health of farmer and consumer	3.74
4	Technology advancement	3.55
5	Resource efficiency and decrease cost	3.62
6	Productivity enhancement and optimize economic	3.77
7	Reducing the environment impact	3.81
8	Government policy	3.59
9	Ethical issues	3.66

Table 9 reports all statements have mean average index between 3.50 to 4.50 which can be classified as high uncertainty. The statement of "reducing the environment impact" with the mean of 3.81 was the highest mean of drivers that give a high uncertainty to use AI in the agriculture sector. Besides, the second highest mean value was 3.77 which includes two statement. The statements were "replacement of employees" and "productivity enhancement and optimize economic". The statement of "safety and health of farmer and consumer" was the third highest mean value (3.74). The statement of "technology advancement" which has 3.55 mean value was the lowest mean of drivers compared with other statements, but it still give a high uncertainty to use AI in the agriculture sector.

Impact-Uncertainty Analysis

Table 10shows the mean value of every statement which regarding AI in the agriculture sector. The mean value obtained for the level of impact and uncertainty is to describe clearly the difference between the two aspects before constructing impact-uncertainty analysis.

Table 10. Mean of Drivers on Level of Impact and Uncertainty

No	Issues and Drivers	Mean	
		Impact	Uncertainty
S1	Advanced in living standard	3.69	3.67
S2	Replacement of employees	**3.83**	**3.77**
S3	Safety and health of farmer and consumer	3.74	3.74
S4	Technology advancement	4.04	3.55
S5	Resource efficiency and decrease cost	3.82	3.62
S6	Productivity enhancement and optimize economic	**3.83**	**3.77**
S7	Reducing the environment impact	3.59	3.81
S8	Government policy	3.67	3.59
S9	Ethical issues	3.23	3.66

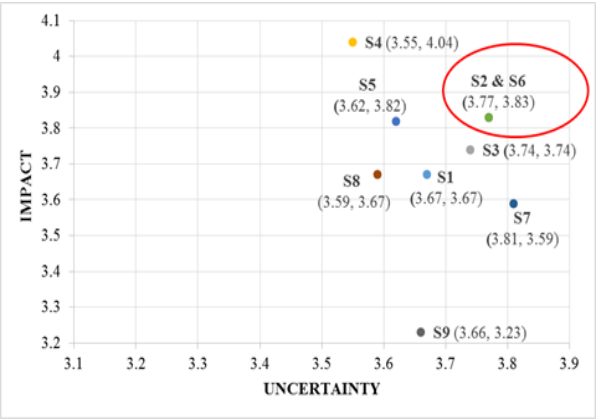

Figure 2. Impact-Uncertainty Analysis

Table 10 reports the highest mean value of impact (4.04) was technology advancement. Moreover, two statements which were "replacement of employees" and "productivity enhancement and optimize economic" have the same second highest mean value of impact (3.83) compare to others.While, the highest mean value of uncertainty (3.81) was "reducing the environment impact". Two statements of "replacement of employees" and "productivity enhancement and optimize economic" also have the same second highest mean value of uncertainty. However, "ethical issues" has the lowest mean value of impact which was 3.23 and the lowest mean value of uncertainty (3.55) was "technology advancement".

Figure 2 shows the impact-uncertainty analysis. The top two drivers with high impact and high uncertainty would be selected regarding AI in the agriculture sector after plotting the chart of scenario analysis. S2 which was replacement of employees and S6 which was productivity enhancement and optimize economic has the highest impact and highest uncertainty in this research. The coordinate for both of the drivers were the same which were (3.77, 3.83).

DISCUSSION AND CONCLUSION

Discussion on First Objective

The first objective was achieved by using STEEPV analysis. All the issues and drivers were merged together and identified the major issues and drivers to complete the data. Social factor refer to the society. AI in the agriculture sector give them the tools to helps farmers cope with an acute shortage of labor (Teresa, 2019). Technological factor had the highest frequency. Dave Coplin who is the chief envisioning officer at Microsoft UK, said that AI is the most important technology that anyone on the planet is working on today (Sam, 2016). Economic factor was the second highest frequency. According to Kathleen (2019), AI able to construct seasonal prediction models which can predict future weather patterns to help farmers make decisions and increase the productivity. Environmental factor refer to the surrounding of work which related to AI in the agriculture sector. AI can reduces the use of herbicide in the field as compared to the volume of normally sprayed chemicals (Jyoti, 2019). Political factor was related to government rules and regulation. It is expected that favorable government policies to promote AI start-ups in agriculture will unlock new growth opportunities for global AI in the agricultural market (Zion Market Research, 2019). Values factor was related to human value and ethical issues. No public sector-focused AI conference would be complete unless it addressed the future ethical considerations that AI will have on society (Kathleen, 2019).The next step of STEEPV analysis was to merge all related issues and drivers. As a result, 9 major drivers were identified as relevant in the future which were shown in Table 2.

Discussion on Second Objective

The impact-uncertainty analysis was to determine the top drivers and finally select the top two drivers based on the highest mean value of impact and uncertainty. The four different scenarios were developed into low impact, high impact, low uncertainty and high uncertainty. Based on Figure 3, the top two drivers which are "replacement of employees" and "productivity enhancement and optimize economic" obtained in the impact-uncertainty analysis were required to conduct the scenario analysis.

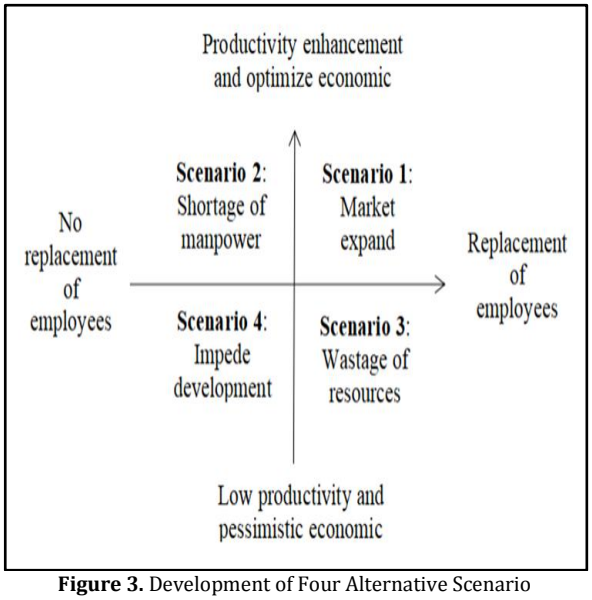

Figure 3. Development of Four Alternative Scenario

Scenario 1 was market expand. Population growth has resulted in quantitative and qualitative changes in food demand that have forced agro-industrial production and market chains to grow (FAO, 2017). AI in the agriculture sector can increase the productivity and optimize the economic as it can identify plants diseases in plants and crop diseases with 98% of accuracy, damage to pest, light change to increase or delay the maturation speed and others (Heba, 2019). The efficiency of work helps to improved productivity and expand the market.Shortage of manpower was Scenario 2. AI in the agriculture sector is important to tackle the productivity challenges of agricultural production because it can handle adverse weather conditions, productivity gains, precision agriculture, and yield control (Nayak, Lokesha, Shariff & Khan, 2019). According to a California Farm Bureau survey, farmers in the nation's top agricultural state are increasingly moving to various forms of mechanization and technology to get around the crunch of farm labor (Jeff, 2019). However, the no replacement of employees with mechanization and technology and the high productivity and optimize economic will bring about the shortage of manpower.

Scenario 3 was the wastage of resources. According to Kathleen (2019), despite fewer people joining the agriculture sector, many farms face a labor shortage problem. AI farming bots are robotics open hardware system which can harvest large crops and more accurately classify and eliminate the weeds (Don Watkins, 2016). The wastage of resources is because the sufficient manpower in agriculture sector with using AI, but the productivity is low and the pessimistic economic. Scenario 4 wasimpede development. AI in agriculture sector is important for maintaining food production in the face of massive global food security problems, malnutrition in Africa and the shortage of agricultural labor triggered by ageing farmers and aging populations (Christine, 2017). Therefore, no replacement of employees and low productivity and pessimistic economic will impede the development of a country and society.

CONCLUSION

In conclusion, this study has been carried out to identify the issues and drivers of AI in agriculture sector and to explore the future trends of AI in agriculture sector in Malaysia.The issues and drivers of AI in agriculture sector were identified through STEEPV analysis which includes social factors, technological factors, economic factors, environmental factors, political factors and values factors. The different sources of reading materials which related to AI in agriculture sector were found to complete the STEEPV analysis. As a result, technological factors have the highest frequency among other factors.The impact-uncertainty analysis and scenario analysis were used to identify the future trends of AI in agriculture sector. Major issues and drivers were conducted in impact-uncertainty analysis and top two drivers which based on the highest level of impact and uncertainty were selected to generate scenario analysis. The top two drivers were "replacement of employees" and "productivity enhancement and optimize economic". The scenario analysis had given a clear view of future trends of AI in agriculture sector.AI in the agriculture sector provides a lot of benefits to the social, technological, economics and environment. The economic will growth as the productivity enhancement and resources efficiency and increase the living standard of people. The agricultural problems such as environmental pollution and labor shortage can be solved with using AI in the agriculture sector. Government policy can make a great improvement to AI in the agriculture sector. However, AI in the agriculture sector may also raise the ethical issues that threaten the people.

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