

# Automotive Servicing and Breakdown Assistance System (ASBAS): Impact of Perceived Ease of Use (PEOU) and Vehicle Breakdown Servicing Necessity (VBSN) on Vendor's Intention to Adopt ASBAS

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## Abstract

Vehicle servicing and breakdown assistance are two major services for automotive industry. Breakdown cases could cause traffic congestion in urban areas where it may lead to undesirable situations for vehicle drivers. In order to overcome this problem, the challenges depend on the efficiency of the vendors to address the emergency cases quickly. We intend to introduce Automotive Servicing and Breakdown Assistance System (ASBAS) to solve the problems that are currently encountered by both vendors and consumers. This system is designed to overcome the hassle and to help both the consumers and vendors to reach out each other quickly and systematically. A survey was conducted to understand the impact of vendor factors on vendors' intention to adopt ASBAS by piloting questionnaire to several vendors. The research proposed model has outlined four different independent variables. The variables were chosen based on the previous study on technology acceptance criteria. This independent variable has vital decision factors that lead to the system adoption rate. Based on the result of data analysis, it shows that Vehicle Breakdown Servicing Necessity (VBSN) and Perceived Ease of Use (PEOU) have a positive impact on vendor's intention to adopt the system. PEOU and VBSN factors become critical contribution in designing the system interface. The results of this study are related to other studies in case of important factors for intention to adopt IT systems. The findings of this study help IT enterprises to come out with innovative ASBAS to satisfy IT market.

**Keywords:** Automotive Servicing, Breakdown Assistance Servicing, Intention to Adopt, Perceived Ease of Use (PEOU), Vehicle Breakdown Servicing Necessity (VBSN)

## 1. Introduction

According to AAM's (Automobile Association Malaysia) analysis, statistic shows that around 40,000 to 60,000 cases that are reported annually encounters vehicle breakdown such as empty gas, flat tire, lockout, engine startup failure and more<sup>1</sup>. Therefore, breakdown assistance and servicing is a critical service in automotive industry.

Based on the interview conducted in the preliminary stage, it is identified that there are limited interactive features available in the vehicle breakdown assistance and servicing systems. This motivates us to come up with an Automotive Servicing and Breakdown Assistance System (ASBAS). This system has been equipped with beneficial features and innovative ideas to assist the vendors and consumers to engage successfully in the

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transactions. Along with that, four core modules have been developed in this system that enable vendors to respond quickly to the transactions. Unique features that come along with this system are reporting, advertisement, servicing assistance, breakdown assistance and centralized information management and many more.

We mainly focus on the consumers from various categories such as vehicle owners, drivers and anyone else utilizing any mode of transportation on the road nationwide. The second target market group would be vendors who deal with tire, mechanic and towing that delivers servicing and breakdown assistance service to respective consumers.

A research study has been conducted to analyze the critical contribution vendor factors that can increase the vendor's adoption to use this system for their daily business. Thus, several objective has been outlined to achieve the goal for this research that are to investigate the level of vendor intention to adopt the system, investigate the relationship of factors (PU, PEOU, TS, VBSN) towards vendors intention, and finally to apply significant factors affecting vendors intention towards interface design of the ASBAS. After the detailed preliminary analysis and research survey, two main variables namely, PEOU and VBSN are identified as critical contributors for the interface design of ASBAS.

## 2. Literature Review

The recent technological advancement in the field of mobility has impressed the current society tremendously. Glass and Saggi<sup>2</sup> clearly described the impact of the mobility advantage to the community in overcoming problems. Based on AAM<sup>1</sup> annual report, breakdown cases that been handled throughout the year 2013 is approximately 44,000. This statistic shows that around 70% of service is resolved immediately which is classified as minor failure breakdown issue. Minor failure breakdown has segregated into several categories like engine failure start up, engine failure heat, lockout, and others. This statistic is only from single organization apart from the other services available nationwide. This clearly shows that the number of vehicles encountering such emergency situation requires the service to be available.

Firstly, the existing manual process is not able to address the transaction request effectively. The manual process is holding back staff as they are unable to provide quick response due to lack of streamlined system with sufficient information available. The blocking of existing process is because many systems that are available in the market are

not streamlined into a single source. Therefore, the required information is not available immediately upon the transaction being raised for any emergency situation whereby the consumer is required to provide information to the vendor for each transaction. Young et al.<sup>3</sup> discussed that non-centralized system may contain inconsistent information that could cause missing information. Currently, most of the transactions are handled via calls or walk-in in order to collect information. When consumers dial a vendor for an emergency request, repeated questions are being asked by the operator. As a result, it leads to late response because accurate information is not available and this leads to a slow response to a transaction. The usefulness of a centralized system could contribute to a more controlled and manageable information system<sup>4</sup>.

Secondly, quick responses features are insufficient in the existing products. This limits a quick response for the consumer when there is an emergency request. In the existing products, the emergency request is being handled by the call center hotline as an interim person before reaching the vendors. This causes the consumers to experience slow responses due to long waiting hours at the call center. This can also lead to a higher call abandoned rate<sup>5</sup>.

Thirdly, vendors do not have any reporting features that show the transaction status that is engaged in a monthly or weekly transaction. Storey et al.<sup>6</sup> indicate that business decision is hardly made without reporting features that represent the numbers to the organization. The existing systems available in the market do not offer this feature along with the system instead; overall count is derived from the organization level and not specific to the vendor's visibility. For an instance, the entire transaction request raised to relevant insurance service or association hotline or call center will be recorded by representing the statistics at the specific organization level. However, it does not display how each workshop panel handled the cases.

Another problem that has been raised is that there is no emergency notification function to address the transaction received from the consumer. Alwan and Ali<sup>7</sup> discussed the impact of accident detection and notification. The research pointed out that traffic congestion may happen if there is delayed respond on the notification received. The research also stated notification system is essential when addressing request that may reduce the responses time. At present, the notification alerting system feature available for the existing transaction method is lacking. As a result, this leads to manual tracking as

there are either no proper records being kept, records missed out or lost.

### 3. Proposed Research Model

Two proposed research model stated by Ozer et al.<sup>8</sup> adopted the TPB model as the base model. Both researchers have adapted the model to fit their requirement to deliver the new proposed model. Previous research had been reviewed to ensure all the view or variable that can be identified and included. The two main independent variables are TS and VBSN adopted from experimental studies by Ozer et al.<sup>8</sup>.

The research proposed model has outlined four different independent variables that are PU, PEOU, TS, and VBSN. The variables were chosen based on the previous study on technology acceptance criteria. This independent variable has vital decision factors that lead to the system adoption rate. Therefore, those variables listed above will be used in the proposed model to evaluate the outcome. Those variables would be combined into proposed research model in this study and explained further.

#### 3.1 Independent Variables

**Perceived Usefulness (PU):** This independent variable has contributed great influence and importance as proven from extensive research over the previous years. PU has been characterized as an individual accepts utilizing a particular context that would add advantage or improve the work or task to accomplish<sup>9</sup>.

**Perceived Ease of Use (PEOU):** PEOU variable has been one of the critical viewpoints that has been considered when analyzing IS adoption literature. PEOU demonstrated that the extent individual would utilize specific idea is a conceivable decrease manual effort<sup>2</sup>.

**Trust and Satisfaction (TS):** Trust and satisfaction is one of the important variables that demonstrated a client's aspiration towards a system that will predict positive future behavior. Satisfaction resides with trust that will reflect consumer's loyalty and it has positive influence to increase the vendor's loyalty and satisfaction. Automotive Servicing and Breakdown Assistance System (ASBAS) is one desirable and trustworthy application that will assist vendors and consumers to fulfill their purpose of usage.

**Vehicle Breakdown Servicing Necessity (VBSN):** Vehicle Breakdown Servicing Necessity is one variable that would be described on the vendors assessment towards the trouble when vehicle breakdown and servicing during

an undesirable situation. This variable was newly developed, and it was described as an outward variable in the Technology Acceptance Model (TAM). Looking on the necessary situation and shorter time leads the vehicle drivers to use this system immediately to defeat the difficult circumstance faced. By utilizing the ASBAS, consumers would know where and how to seek help that will indirectly save their time.

#### 3.2 Dependent Variable

**Vendor's Behavioral Intention (BI):** Vendor's Behavioral Intention (VI) is a measure of the vendor's intention on quality and expectation to perform a predetermined behavior. The vendor's real behavior is dictated by their BI to utilize the technology. Ajzen<sup>10</sup> stated that VI reflects how hard a person is willing to attempt, and how motivated an individual is, to perform the behavior. BI is the closest indicator of behavior stated by Ajzen<sup>10</sup>, and behavior is the last variable that shows how well communicated intervention is influenced. BI is proposed on this research model to evaluate understanding the cooperation of the other independent variable that may result towards the ASBAS.

### 4. Research Hypotheses

Research hypotheses will be formulated based on the evidence as four different independent variables which is PEOU with PU, TS, and VBSN in the framework of ASBAS. Therefore, research method has outlined five hypotheses as shown in Table 1.

**Table 1.** Hypotheses

Hypothesis	Description
H1	Perceived Usefulness (PU) has a positive relationship on Vendor's Behavioral Intention (BI) to adopt the ASBAS.
H2	Perceived Ease Of Use (PEOU) has a positive relationship on Vendor's Behavioral Intention (BI) to adopt the ASBAS.
H3	Trust and Satisfaction (TS) have a positive relationship on Vendor's Behavioral Intention (BI) to adopt the ASBAS.
H4	Vehicle Breakdown Servicing Necessity (VBSN) has a positive relationship on Vendor's Behavioral Intention (BI) to adopt the ASBAS.
H5	There is a positive relationship between all factors on Vendor's Behavioral Intention (BI) to adopt the ASBAS.

Figure 1 demonstrated the proposed research model. As stated earlier, there are four independent variables namely PU, PEOU, TS, and VBSN. BI, the dependent variable will be utilized in this proposed research model towards ASBAS.

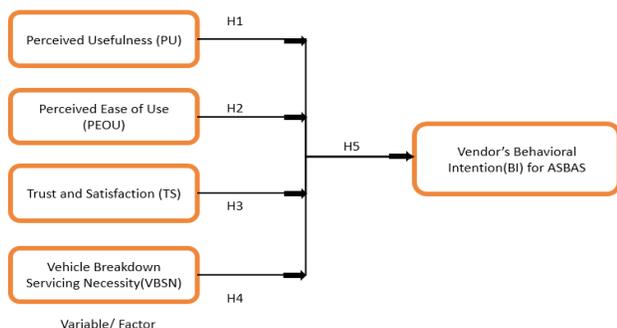


Figure 1. Proposed research model.

## 5. Research Design

This research studies the relationship between PU, PEOU, TS, and VBSN and vendor's BI towards ASBAS. The research study has been carried out by using a questionnaire that is divided into five different variable categories that was adopted from various sources i.e. PU, PEOU, TS, and VBSN and vendor's BI to adopt the system. The questionnaire is designed to understand the relationship between independent variable towards dependent variable. Secondly, the most impactful variable towards ASBAS for higher adoption rate is identified.

The data collection process has been conducted over a couple of months from April 2015 until May 2015. The questionnaires are distributed to 15% of the total vendor list from the target market. The main reason of 15% of the total vendor is based on confidence interval and confidence level. The confidence level is set to 95% to calculate the confidence interval (Margin of error) that scored 7.38. Our respondents focus on vendors that provide services to their respective consumers with several backgrounds of services.

The survey collection from the respondent is a total of 150. The valid respondent that replies is N=104, 32 respondent's questionnaires were not received due to some reasons and 17 questionnaires were found not completed due to uncertain reasons. Table 2 shows the number of questionnaires and status.

Table 2. Number of questionnaires and status

Questionnaires	Total
Questionnaires sent	150
Questionnaires with valid replies	104
Questionnaires not completed	17
Questionnaires not returned	32

## 6. Data Analysis and Results

Statistical Package of Social Science (SPSS) is used to analyze data from the questionnaire. The analysis that is conducted by using the tool is the descriptive statistics, reliability analysis, and regression analysis.

### 6.1 Descriptive Statistics

From the analysis, it was found that majority of respondents (55%) are mechanic workshop vendors and followed by 41% of the respondents are tire shop vendors and the balance 4% was towing shop vendors. For the business hours, vendors were aggregated into two categories i.e. a normal business hour from 9 am to 6 pm, and 24 hours; this is to understand service availability hours from vendors. Based on the respondent, 71% of the vendors are operating their business 24 hours a day while the rest of the 29% operated normal working hours. The research study is also conducted for insurance panel that are associated with vendors. This information is vital when the breakdown transaction raised requires panel workshop. From the analysis of insurance panel data collection, it was found that 78 vendors (34%) have a partnership with Kurnia Insurance as workshop panel compared to 12 other insurance providers. We have nearly 277 different selections since one vendor may partner with many insurance panels. From the survey, we also understand that most of the vendors prefer to pay out the transaction via commission rate instead of any other packages charges. On the communication type, currently, three different types of communication that connect vendors with their consumers are dial-in, call center and walk-in. Among this three options, currently most of the transaction are done via dial-in option at 58% that is equivalent to 60 respondents.

## 6.2 Reliability Analysis

This formula has been suggested by Cronbach<sup>11</sup> which was adopted by most researchers. This study used Cronbach's coefficient alpha to measure the reliability of every factor. To test the internal consistency of instrument, reliability examination was directed on the components in the proposed research model. Each of the variables was tested for reliability test before it was considered for the following analysis<sup>12</sup>.

After performing the reliability (Cronbach's alpha) using the SPSS software, the following result were obtained where PU scored at 0.88, following that PEOU scored at 0.81 and TS and VBSN scored 0.85 and 0.82 respectively. The coefficient reliability measurement for each variable is shown in Table 3. Based on this, it shows that PU has a good internal consistency among the other variables in this research.

**Table 3.** Reliability analysis based on cronbach alpha

Variables	Number of items	Item Dropped	Cronbach Alpha
Perceived Usefulness (PU)	7	-	0.88
Perceived Ease of Use (PEOU)	6	-	0.81
Trust and Satisfaction (TS)	6	-	0.85
Vehicle Breakdown Servicing Necessity (VBSN)	5	1	0.82
Behavioral Intention (BI)	4	1	0.87

Vehicle Breakdown Servicing Necessity (VBSN) and Behavior Intention (BI) have to drop one entry each to enhance reliability analysis. The entry was expelled out from the analysis during the process of enhancing reliability.

SPSS computes coefficient alpha for the beginning pool of entry and it additionally computes coefficient alpha of measure if a particular entry was dropped from the measure. Raykov<sup>13</sup> describe that to enhance the coefficient some entry can be dropped to get the measurement as "Alpha if deleted" which means the result of coefficient alpha increases if the entry is deleted. That entry which, if excluded from the measure, would diminish the measure's coefficient alpha has to be kept. The entry that would inflate the measure's coefficient alpha if dropped should be expelled from the measure.

Deletion of the entry "Vendor should take extra effort for handling special cases" expanded the reliability of the VBSN measurement to 0.826. Thus, deletion of the entry "I intend to use the ASBAS to perform marketing improvement" expanded the vendor Intention reliability scale to 0.878. Table 3 shows Cronbach Alpha for every factor.

## 6.3 Correlations

Correlation analysis has been carried out to understand the relationship between independent variable. This research study adopted Bivariate Correlation method to be applied on proposed hypotheses. These are the best method to represent it and values are shown in Table 4.

**Table 4.** Matrix of correlation

	PU	PEOU	TS	VBSN	BI
Perceived Usefulness (PU)					
Pearson Correlation	1				
Perceived Ease of Use (PEOU)					
Pearson Correlation	0.692	1			
Trust and Satisfaction (TS)					
Pearson Correlation	0.511	0.546	1		
Vehicle Breakdown Servicing Necessity (VBSN)					
Pearson Correlation	0.511	0.546	0.770	1	
Behavioral Intention (BI)					
Pearson Correlation	0.504**	0.615**	0.591**	0.688**	1

\*\* Correlation is major at the 0.01 level

For Pearson Correlation, coefficients extends between - 1.00 to +1.00 in a size where 0.00 indicates no relationship between two variables. If the value falls in - 1.00 or +1.00, this shows the flawless connection. According to Guilford<sup>14</sup>, correlation coefficient scale stated that if correlation that is less than 0.20 scales is negligible, 0.20 until 0.40 correlation is low; 0.40 to 0.70 is showing high

correlation and if the score is above 0.90, it indicates a very high correlation. Analysis result indicates that PEOU and VBSN scored 0.615\*\* and 0.688\*\* respectively in relation towards vendor's BI. This shows positive relationship with outstanding correlation compared with other variables. Apart from that, the relation between TS towards BI showing a positive relationship at 0.591 based on Pearson correlation relationship that indicates there are bounding between each other. Lastly, PU and BI also show a positive relationship with a score of 0.504.

### 6.4 Regression Analysis

Simple regression analyzes the relationship between two variables. According to Kutner<sup>15</sup>, simple linear regression is one method that can model the variable relationship between response variable in axis Y, explanatory variable in axis X and  $\beta$  as an unknown parameter. Table 5 shows result from the regression analysis.

The following is the explanation of simple linear regression results as in Table 5.

- i). The relationship between PU and BI  
 H1: PU has a positive relationship on vendor's Behavioral Intention (BI) to adopt the ASBAS  
 H1 is supported as there is a relationship between PU and BI. From the simple linear regression shown in Table 5, the beta coefficient is 0.504. From R Square, we can conclude that at least 25% of the variation in the dependent variables can be explained by variation in the independent variables.
- ii). The relationship between PEOU and BI  
 H2: PEOU has a positive relationship on vendor's Behavioral Intention (BI) to adopt the ASBAS  
 H2 is supported as there is a relationship between PEOU and BI. From the simple linear regression shown in Table 5, there is a model with beta coefficient 0.615. From R Square, we can conclude that at least 37% of the variation in the dependent variables can be explained by variation in the independent variables.
- iii). The relationship between TS and BI  
 H3: TS has a positive relationship on vendor's Behavioral Intention (BI) to adopt the ASBAS  
 H3 is supported as there is a relationship between TS and BI. From the simple linear regression shown in Table 5, there is a model with beta coefficient 0.591. From R Square, we can conclude that at least 47% of the variation in the dependent variables can be explained by variation in the independent variables

- iv). The relationship between VBSN and BI  
 H4: VBSN has a positive relationship on vendor's Behavioral Intention (BI) to adopt the ASBAS  
 H4 is supported as there is a relationship between VBSN and BI. From the simple linear regression shown in Table 5, there is a model with beta coefficient of 0.688. From R Square, we can conclude that at least 34% of the variation in the dependent variables can be explained by variation in the independent variables. Table 6 indicates the significant value of each hypothesis

**Table 5.** Simple linear regression results

Independent Variable	Standardized Coefficients (β)	R Square
Perceived Usefulness (PU)	0.504	0.254
Perceived Ease of Use (PEOU)	0.615	0.378
Trust and Satisfaction (TS)	0.591	0.473
Vehicle Breakdown Servicing Necessity (VBSN)	0.688	0.349

**Table 6.** Hypotheses acceptance

Hypotheses	Significant Value	Hypotheses Accepted or rejected
H1: PU has a positive relationship with vendor Intention to adopt ASBAS.	P<0.01	Accepted
H2: PEOU has a positive relationship with vendor Intention to adopt ASBAS.	P<0.01	Accepted
H3: TS has positive relationship with vendor Intention to adopt ASBAS	P<0.01	Accepted
H4: VBSN has positive relationship with vendor Intention to adopt ASBAS	P<0.01	Accepted

### 6.5 Multiple Regressions

Multiple regressions are an expansion of simple linear regression. It is utilized when we need to anticipate the estimation of a variable given the estimation of two or more different variables. The variable we need to foresee is known as the dependent variable. The variables we are utilizing to foresee the dependent variable is known as the independent variables.

Table 7 shows the values from multiple regression results that were calculated, we use this to analyze and understand

whether the hypotheses made earlier are supported or not. In Table 7, R Square value that is a critical point indicates the relationship direction (positive or negative) among the dependent variable and independent variable.

The adjusted R square value shows 51.4% indicates it has significant value to add to the proposed research model accounts. Analysis of variance (ANOVA) assesses the overall proposed research model. When p value is equal or less than 0.05, this shows that the proposed research model is significant. 53.3% variance shown in the dependent variable is well described and explained in independent variables used which is PU, PEOU, TS and VBSN and balance percentage is involved and provided detail on independent variable that is outside of the model at around 46.7%.

The range of value R is from 1 to - 1. Table 7 shows how strong vendors BI relationship towards VBSN which scored ( $\beta = 0.424$ ,  $p = 0.003$ ).

Besides that, vendors BI indicates that it has a positive impact towards independent variable PEOU ( $\beta = 0.290$ ,  $p = 0.009$ ). TS also have a positive impact towards vendor's BI dependent value. ( $\beta = 0.107$ ,  $p = 0.344$ ). Furthermore, another independent variable PU showed poor factor towards the proposed research model ( $\beta = 0.009$ ,  $p = 0.946$ ).

Creech (2010) stated that Analysis Of Variance (ANOVA) is testing hypotheses about the mean (average) of a dependent variable between various groups.

**Table 7.** Multiple regression results show the relationship between independent factors and dependent factor and vendor's intention to adopt ASBAS

Independent Variable	Variable Dependent = Vendor's Behavioral Intention Standardized Coefficients ( $\beta$ )	Significant. P
Model Variable		
PU	0.009	0.946
PEOU	0.290**	0.009
TS	0.107	0.344
VBSN	0.424**	0.003
R	.731a	
R Square	0.533	
Adjusted R square	0.514	
Significance p	0.000	
Durbin-Watson	2.076	

## 7. Factors that Affect Vendor Intention to Adopt ASBAS

Based on the results that are analyzed, it is found that factors that influence vendor BI of using ASBAS are PEOU and VBSN. These two independent factors have indicated influence towards vendor intention that encourages the use of the system. Research from the result indicates that both factors should be the key focus when designing the ASBAS as it will lead to a higher rate of adoption among vendors.

PEOU factor will be integrated on system designing. Each of the characteristics will align and delivers more significantly for better adoption rate as explained above. Apart from that, a deeper observation in the result shows that VBSN has significant effect towards intention due to many vendors are capable of providing extensive services in emergency cases in handling breakdown and servicing. VBSN factor will be integrated as interactive, notification and flexible. Each of the features will deliver the purpose for vendor usefulness for a better system. Therefore, vendors are keen to use and utilize the proposed system based on the features and functions that are available in the system.

## 8. Conclusion

Jay Technology solution uses 4P's marketing mix strategy that is offering product, price, place, and lastly promotion to market ASBAS. By having such strategy, we can sustain longer in the market among different competitors. Various marketing programs will be used to promote the product to vendors and consumers. Within three years, we hope to have high ROI and after that company profit will increase.

The research conducted via preliminary study and survey stages is to understand the concerns and vendors expectation towards a future system that fulfill their needs. After interview session completed, we have identified several useful feedbacks on the features and process to improve. The questionnaires were distributed to vendors to identify the most impactful factors.

The research result indicates that all the research objectives have been met. Vendor's intention mean value shows 5.65, this indicates which is positive. Following on it, the relationship between independent variables towards dependent variable shows that all the factors has positive relationship with vendor's Behavioral Intention (BI). The two significant variable that influence the vendor's

adoption are PEOU and VBSN. PEOU and VBSN are the most important aspect that is integrated into ASBAS interface design in order to improve the ASBAS.

## 9. Acknowledgement

The authors would like to acknowledge Universiti Sains Malaysia (USM) as this research has been supported from the Short Term Research Grant [Account Number: 304/PKOMP/6312103] and from the Research University Grant (RUI) [Account Number: 1001/PKOMP/811251] from the Universiti Sains Malaysia. Special Thanks to Mr. Mohammad Ali Bagheri for his help and contribution in preparing and publishing this paper.

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