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Acceptance Analysis of Shipbuilding Dynamical Resources Planning System by Using Technology Acceptance Model

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ABSTRACT

The Technology Acceptance Model (TAM) is often used in studies related to the application of technology in community. In the context of shipbuilding planning system, the relation between perceived usefulness and perceived ease of use towards the intention to use from a user's perspective was studied. Dynamical Resources Planning System (DRPS) is a new approach for shipbuilding production planning strategy that was developed from the zone construction methodology. In this study, the user acceptance of DRPS implementation was tested by using TAM approach among 71 employees who were directly involved with the system via survey questionnaire. Data were analyzed by using the Statistical Package for Social Science (SPSS). Regression analysis showed that all hypotheses had a significant effect, supported with $p<0.05$, which concluded that TAM is the best model to validate the user acceptance of DRPS implementation in a shipyard. In conclusion, the employees can accept the existence of this system and a high acceptance level is a significant sign in explaining the effectiveness of a new planning system adopted in a shipyard.

1. Introduction

Shipbuilding technology has now entered the era of modernisation and expanded rapidly around the world. Developed countries, such as Korea and Japan have long experience on growth adoption of advanced technology effective planning system in the industry. The use of technology, particularly information technology and delivery system, is now widely used as a catalyst in improving the productivity and rapid development of shipbuilding. Malaysia has been actively involved in shipbuilding and marine since the 1900s [1] but is still currently lower in many ways as compared to other regions. The Malaysian government through the shipbuilding and ship repair industry report has classified the shipbuilding industry in Malaysia as a strategic industry that is engaged in designing,

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building and constructing, converting and upgrading of vessel, including marine equipment manufacturing [2]. Recently, the development of shipbuilding industry in the country is slowly growing but it is observed to lack in strategic planning. Based on a research specific on industrial engineering, one of the useful methods is production planning and control [3]. Moreover, a few strategies that need improvement are the development of modern technology and the use of new planning tool and system.

Shipyard has been struggling to achieve efficient planning in all shipbuilding processes. Throughout the decades, a lot of planning strategies and models were introduced to increase the effectiveness of the monitoring and controlling processes during the production stage, for example, the spatial planning system [4,5], aggregate production planning [6,7], lean production planning [8] and integrated hull, outfitting and painting scheduling [9,10]. In shipbuilding, the aim and objective are still the same regardless of the planning models and methods used, with emphasise on productivity, integration of manufacturing process, less cost and reduction of deliverable lead time. The ship outfitting process has become a necessary requirement for shipbuilding to be performed stage by stage, and from erection until the launching of ship [11]. Time estimation needs to be properly determined during the erection stage, especially the one related to the ship block manufacturing planning [12].

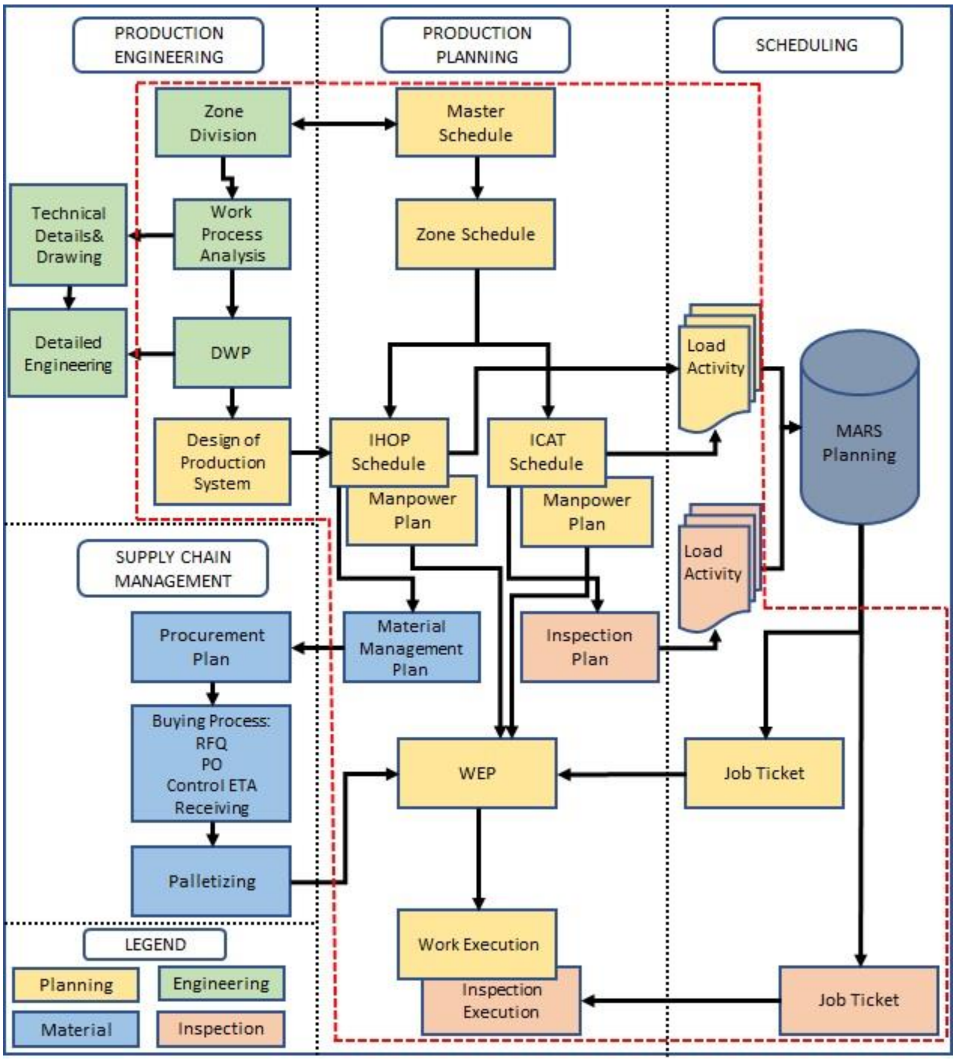

Fig. 1. DRPS framework

The right planning strategy is also being benefit and operated well through integration with the existing enterprise resource planning (ERP) system. Most shipyard utilise the ERP system to run their business operations. Previous studies on the adoption ERP in shipbuilding planning [5,9] designed the planning strategy as an integration tool to improve performance via computer aided ERP. Shipyards utilise the MARS Planning as a dedicated computerised shipbuilding specific solution to integrate it with ERP. The best planning strategy will ensure that effective changes can be made to improve productivity, capability, and competency. The proper use of the technique ensures that the project completes on schedule, and delays can be avoided.

Dynamical Resources Planning System (DRPS) is a new approach for production planning strategy that was developed from the zone construction methodology. The new system framework, as illustrated in Figure 1, aims at increasing the reliability of production planning during construction and production stage with the scope of study outlined in red dash line. DRPS was implemented in a case study at Boustead Naval Shipyard Sdn. Bhd., Lumut, Perak. The implementation commenced in the middle of a running project, where the second Royal Malaysian Navy (RMN) ship was undergoing a ship life extension programme (SLEP), which was a contract from the government. The project suffered a critical delay half-way through the programme at a variance of -16.11% behind time (about 12 weeks). The aims of this implementation were to cater the critical delay, recover the installation and on board outfitting job with concurrent resources allocation, and shorten the timeline towards the completion date.

This planning system implementation in the shipyard affected the acceptance behaviour of employees and project participants, such as managers, engineers, supervisors, and labours. In technology usage research, the user behavioural intention and actual system usage are addressed by using the technology acceptance model (TAM). Davis first created the TAM model [13] based on the Theory of Reasoned Action. The model is extended from the psychology theory, which explains the behaviour of technology users based on belief, attitude, intention, and user behaviour relationship. The purpose of this model is to explain the key factors of user behaviour towards technology acceptance. This model states the attitude factor of each user behaviour with two main variables, which are usefulness and ease of use. TAM is widely used in different fields of technology application, such as education, marketing, banking and information technology [14]. Therefore, in this study, TAM was used to evaluate the acceptance of the DRPS technology.

2. Technology Acceptance Model (TAM)

2.1 Concepts of TAM

Davis [13] introduced TAM in 1989 to predict end-user acceptance towards new technology based on the theory of justification. The original TAM model was constructed from the Theory of Reasoned Action (TRA). Fishbein and Ajzen are the founders of the TRA model in psychology research, as elaborated by several authors [15-18]. TRA is illustrated in Figure 2. Masrom [15] explained that TRA individual behaviour is driven by behavioural intention, which is a function of an individual’s attitude towards the behaviour and subjective norms surrounding the behaviour performance. According to the model, behaviour is the function of attitude and belief. Based on the TRA model, intention is the determinant of the occurrence of a behaviour, where an individual’s belief will influence an individual’s attitude and later create an intention that will result in a behaviour. This model explains that a person’s attitude towards a subject’s behaviour and subjective norms will determine the intention of the behaviour. An individual’s attitude towards a behaviour refers to the individual’s assessment on whether the behaviour is good or bad.

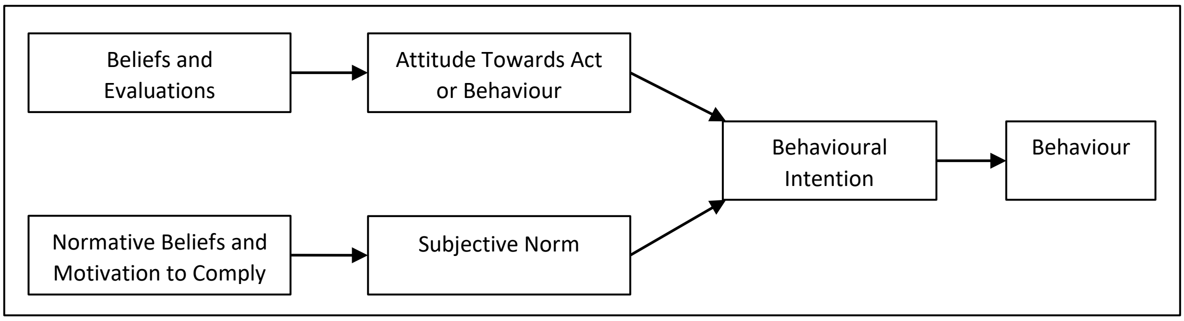

Fig. 2. Theory of reasoned action [9]

The goal of TAM is to provide a basis that can demonstrate the influence of external variables on internal beliefs, attitudes, and behavioural desires. Two constructs related to internal belief that act as the main components in TAM are perceived usefulness and perceived ease of use. In TAM, perceived usefulness refers to the degree to which the user believes that using the technology will improve work performance, while perceived ease of use refers to a person's perception of how effortless use of the technology will be. The basic TAM model as recommended by Davis [13] and reinforced by Venkatesh [17] is shown in Figure 3.

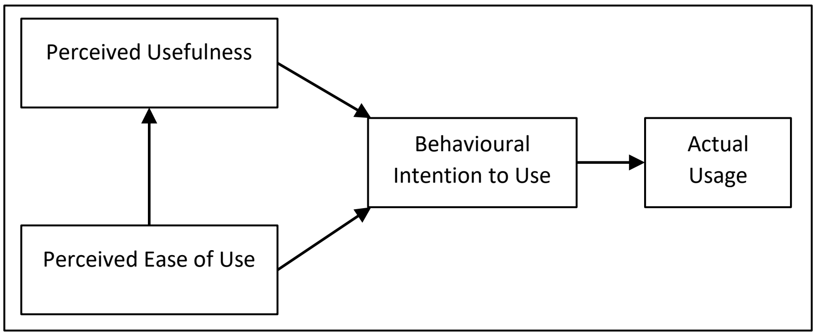

Fig. 3. Basic technology acceptance model

This model illustrates the factors that influence a user's decision to use the new system, namely usefulness and ease of use. Perceived usefulness shows that the user is confident with the system's contribution towards his or her work performance, whereas perceived ease of use shows that the user feels easy and comfortable to drive the system without any problem or interruption. Davis [13] explained that perceived ease of use influences perceived usefulness based on the phrase "making a system easier to use, should make the system more useful". Behavioural intention to use refers to the behaviour tendency to remain using such technology or system. Individual believes that with a sincere intention, interest and effort will be generated to use the new technology or system. Perceived usefulness and perceived ease of use influence the actual system use through intervening variable behavioural intention to use.

2.2 Research Model for DRPS

According to Surachman [19], behavioural intention to use and actual system use can be merged to form user acceptance of a system. This means that both constructs, i.e. perceived usefulness and perceived ease of use, have direct influence on user acceptance that consists of intention to use and actual system use. The reduced usage of TAM model in certain studies are supported by Masrom

[15], Ali Khan *et al*., [20], Ismail and Noor [21], and Asadi *et al*., [22] by excluding the actual system use. As such, the research model employed in this study is as shown in Figure 4. This model focused on the relational measurement between perceived usefulness and perceived ease of use towards the intention to use. The same research model was explored and utilised by other authors [15-17,19,20,23]. The research by Asadi *et al*., [22] and Mekhzoumi *et al*., [24] utilised the intention to use as the dependent variable, whereas perceived usefulness, perceived ease of use and other extended variables were used as the independent variables.

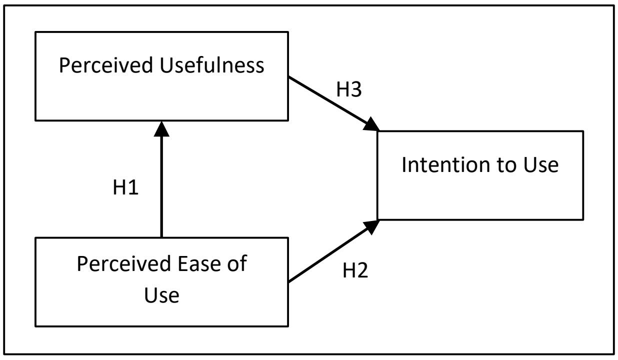

Fig. 4. The research model for DRPS

Therefore, the hypotheses set for the TAM model to validate the acceptance of end-user on DPRS implementation were:

i. H1: Perceived ease of use has a significant effect on the perceived usefulness of DRPS.
ii. H2: Perceived ease of use has a significant effect on the intention to use DRPS.
iii. H3: Perceived usefulness has a significant effect on the intention to use DRPS.

3. Methodology
3.1 Case Study

The case study was conducted by applying the DRPS on a running shipbuilding project in a shipyard. As such, a survey was conducted on employees in the SLEP department who were directly involved in the implementation of this system. Since this new planning system was tested for the first time in that department, the study managed to get 74 respondents. The respondents were inclusive of head of department, administration unit, project manager and management team, planning unit, production team and support unit. Each respondent was given a set of questionnaires to evaluate the application of TAM on the DRPS in the shipyard. Upon completion, a total of 72 responses were received. One response was rejected because it did not fulfil the survey requirement, as it had double answers on several question items. Therefore, the collected data was N=71, with a response rate of 95.95%.

3.2 Questionnaire Development

The form has four parts, namely Section A, Section B, Section C and Section D. Section A consists of six demographic questions that are relevant data on occupation, which are gender, age, race, education level, designation in organisation and year of service. Based on Masrom and Park [15,16] this section was designed to identify the demographic attributes of the respondents that will support the final analysis later.

Section B, Section C and Section D refer to the TAM model, whereby the questions were based on TAM basis points from Davis [13]. Section B measures the perceived usefulness of DRPS, Section C measures the perceived ease of use of DRPS, while Section D measures the intention to use DRPS. The design of questions in the three sections was a mix of Davis [13] with other studies [15-17,19,20,25]. Necessary modifications were made to suit the specific context on industrial environment and scope of DRPS. Section B and Section C consist of 12 questions and Section D has 8 questions. The measurement items used in Section B, Section C and Section D for perceived usefulness, perceived of use and intention to use with the supporting literature are listed in Table 1, Table 2 and Table 3, respectively.

Table 1
Item to measure perceived usefulness

No	Measurement Item	Literature
1	Using DRPS in my job would increase my productivity.	Davis[13]; Masrom[15]; Park[16] Venkatesh[17]; Dalimunthe[25]
2	DRPS enables me to accomplish tasks more quickly.	Davis[13]; Ali Khan[20]
3	Using DRPS gives me greater control over my work.	Davis[13]
4	Using DRPS enhances my effectiveness on the job.	Davis[13]; Masrom[15]; Venkatesh[17], Dalimunthe[25]
5	I would find the DRPS is useful in my job.	Davis[13]; Masrom[15]; Venkatesh[17]; Ali Khan[20]
6	I find that communication process in DRPS would improve my job performance.	Davis[13]; Masrom[15]; Park[16]; Venkatesh[17]
7	Using DRPS would improve the accuracy of decision making.	Davis[13]; Masrom[15]; Ali Khan[20]
8	I am confident in using information from DRPS for my job execution.	Ali Khan[20]
9	Using dynamic monitoring and control in DRPS enable me to have fully control of my task.	Davis[13]
10	I found intensive control mechanism applied in DRPS is useful to monitor the job progress.	Davis[13]; Ali Khan[20]
11	Using the systematic monitoring in DRPS would improve the quality of my job.	Davis[13]
12	I found it easier to do my job with the capability of DRPS	Davis[13]; Park[16]; Dalimunthe[25]

Table 2
Item to measure perceived ease of use

No	Measurement Item	Literature
1	It is easy for me to remember how to perform tasks using the DRPS.	Davis[13]
2	I found it is easy to operate the DRPS in my daily task.	Masrom[15]; Venkatesh[17]
3	My interaction with the DRPS would be clear and understandable.	Davis[13]; Masrom[15]; Venkatesh[17]
4	I found that the DRPS was interested and interactive.	Davis[13]
5	It would be easy for me to use information in DRPS.	Masrom[15], Park[16], Venkatesh[17]
6	I found the communication is easy to apply in DRPS.	Venkatesh[17]
7	Learning to use the DRPS would be easy for me.	Masrom[15], Park[16]
8	I found the information process in DRPS is accessible and controllable.	Davis[13], Dalimunthe[25]
9	I found the dynamic monitoring and control in DRPS is uncomplicated and simplify.	Davis[13]
10	I would find the DRPS to be flexible to interact with.	Davis[13], Dalimunthe[25]
11	It would be easy for me to become skillful at using DRPS.	Davis[13], Park[16]
12	On overall, I found the DRPS is easy to use.	Davis[13]; Masrom[15]

Table 3
Item to measure intention to use

No	Measurement Item	Literature
1	I intend to use DRPS in my duty.	Masrom[15]
2	I intend to be a heavy user of DRPS.	Park[16]
3	I intend to increase the usage of DRPS in the future.	Masrom[15]; Ali Khan[20]
4	I will promote the good practice in DRPS to another user.	Surachman[19]
5	I feel highly motivated to keep using DRPS.	Surachman[19]
6	I intend to change from old planning system to DRPS.	Ali Khan[20]
7	I am positive towards DRPS to adapt the better changing.	Park[16]; Venkatesh[17]
8	I will continuously apply DRPS to the best practice.	Masrom[15]; Ali Khan[20]

The 5-point Likert scale was used in the questionnaires, which needed five points of opinion and response that ranged from 1 to 5 as follows: 1 = "most disagree", 2 = "disagree", 3 = "moderate", 4 = "agree", and 5 = "most agree".

3.3 Statistical Test

The collected data and survey information were analysed by using the SPSS software. In this study, the statistical testing used were (1) Cronbach's alpha reliability test, (2) descriptive statistic and (3) regression analysis. The Cronbach's alpha reliability test was used to evaluate the consistency level of a set of questions to measure the variables. Referring to Sekaran [26], the reliable value is when the Cronbach's alpha > 0.7, which is a good value. Descriptive statistic was used to measure the frequency and percentage on demographic data, while the regression analysis was used to investigate the relationship between the independent and dependant variables in the hypotheses testing. The significance level of 95% ($p < 0.05$) was used to validate the testing. The p-value is often identified in SPSS with abbreviation such as 'Sig' or 'Prob'.

3.4 Reliability Analysis

The Cronbach's alpha value was used to measure the reliability of all items in this study. This is important to ensure that the scales used in the questionnaire were not ambivalent [27]. Following Sekaran [26], an alpha of more than 0.7 is regarded acceptable and indicates that the items are homogeneous and measuring the same constant [15]. Table 4 shows the reliability of the constructs. The Cronbach's alpha reliability values were all over 0.7, which were considered good. The original study Davis [13] also measured the reliability of construct with a value between 0.91 and 0.97. Moreover, related studies such as Masrom [15] found the Cronbach's alpha value between 0.85 and 0.89, while Surachman [19] recorded the value between 0.81 and 0.85. Besides that, [23] reported the Cronbach's alpha value between 0.73 and 0.86. The latest research Asadi et al., [22] observed the value to be between 0.76 and 0.80.

Table 4
Item to measure intention to use

Construct	Total Item	Cronbach's alpha
Perceived usefulness	12	0.719
Perceived ease of use	12	0.705
Intention to use	8	0.705

4. Result and Discussion
4.1 Demographic Analysis

Descriptive analysis on the demographic sample was conducted. From the 71 responses data, 78.9% were male respondents and 21.1% were females. About 23 respondents (32.4%) aged between 31 and 40 years old, and 41 and 50 years old. 16.9% aged between 21 and 30 years old and 18.3% aged between 51 and 60 years old. Other demographic information of the respondents is shown in Table 5. As can be seen, 97.2% were Malays, while the remaining were Indians (2.8%).

Table 5
Demographic information of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	56	78.9
	Female	15	21.1
Age	21 - 30	12	16.9
	31 - 40	23	32.4
	41 - 50	23	32.4
	51 - 60	13	18.3
Race	Malay	69	97.2
	Indian	2	2.8
Education Level	Master	3	4.2
	Bachelor's Degree	34	47.9
	Diploma	18	25.4
	Certificate	16	22.5
Designation	Managerial	8	11.3
	Technical Executive	43	60.6
	Supervisor	5	7.0
	Technician	11	15.5
	Clerical	4	5.6
Year of Service	< 3	3	4.2
	3 - 5	12	16.9
	6 - 9	25	35.2
	10 - 15	20	28.2
	16 - 20	10	14.1
	> 20	1	1.4

Most respondents held a bachelor's degree, followed by diploma, certificate and master's degree (47.9%, 25.4%, 22.5%, 4.2%, respectively). Among that, 60.6%, 15.5%, 11.3%, and 5.6% worked as technical executives, technicians, managers, and clerks, respectively. In terms of year of service in the organisation, the data recorded 35.2%, 28.2%, 16.9%, 14.1% and 4.2% of respondents had 6–9, 10–15, 3–5, 16–20 and less than 3 years of service, respectively. Only one person (1.4%) had more than 20 years of service.

4.2 Regression Analysis

The acceptance of the DRPS implementation was tested by using the SPSS software based on the 71 response data collected. A regression analysis was performed to test three hypotheses on the TAM model. To test Hypothesis 1 (H1), perceived ease of use was set as the independent variable, while perceived usefulness was set as the dependent variable. Table 6 shows the regression results for H1.

Table 6
Regression model summary result for H1

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
H1	.774[a]	.599	.594	3.21690

a. Predictor: *(Constant), Perceived Ease of Use*

Based on Table 6, the correlation value or relation between the independent variable (perceived ease of use) and dependent variable (perceived usefulness) was shown by R^2=0.599, which meant that perceived ease of use had about 59.9% of influence on perceived usefulness.

Table 7
ANOVA regression result for H1

ANOVA (Dependent Variable: *Perceived Usefulness)*					
Model	Sum of Squares	df	Mean Square	F	Sig.(p)
Regression	1068.747	1	1068.747	103.276	.000[a]
Residual	714.041	69	10.348		
Total	1782.789	70			

a. Predictors: *(Constant), Perceived Ease of Use*

As illustrated in Table 7, the perceived ease of use had a significant influence on perceived usefulness based on the significance value p=0.000, which resulted in p<0.05.

Table 8
Coefficients regression result for H1

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (p)
	B	Std. Error	Beta		
(Constant)	9.589	3.534		2.713	.008
Perceived Ease of Use	.774	.076	.774	10.162	.000

a. Dependent Variable: *Perceived Usefulness*

From Table 8, it can be observed that t=10.162, with significance value p=0.000, p<0.05. Therefore, H1 was accepted. The perceived ease of use variable had a significant influence on perceived usefulness.

Then, the same method was repeated to test Hypothesis 2 (H2). This time, perceived ease of use was set as the independent variable and intention to use was set as the dependent variable. The regression model summary result for H2 is shown in Table 9.

Table 9
Regression model summary result for H2

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
H2	.741[a]	.550	.543	2.63899

a. Predictor: *(Constant), Perceived Ease of Use*

Based on Table 9, the correlation value or relation between the independent variable (perceived ease of use) and dependent variable (intention to use) was shown by R^2=0.550, which meant that perceived ease of use had about 55% of influence on intention to use.

Table 10
ANOVA regression result for H2

ANOVA (Dependent Variable: *Intention to Use)*					
Model	Sum of Squares	df	Mean Square	F	Sig.(p)
Regression	586.199	1	586.199	84.173	.000[a]
Residual	480.533	69	6.964		
Total	1066.732	70			

a. Predictors: *(Constant), Perceived Ease of Use*

As indicated in Table 10, perceived ease of use had a significant influence on intention to use based on the significance value p=0.000, which resulted in p<0.05.

Table 11
Coefficients regression result for H2

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (p)
	B	Std. Error	Beta		
(Constant)	4.175	2.899		1.440	.154
Perceived Ease of Use	.573	.062	.741	9.175	.000

a. Dependent Variable: *Intention to Use*

From Table 11, it can be observed that t=9.175, with significance value p=0.000, p<0.05. Therefore, H2 was supported. The perceived ease of use variable had a significant influence on intention to use.

Lastly, to test Hypothesis 3 (H3) perceived usefulness was set as the independent variable and intention to use was set as the dependent variable. The regression model summary result for H3 is shown in Table 12.

Table 12
Regression model summary result for H3

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
H3	.699[a]	.489	.481	2.81169

a. Predictor: *(Constant), Perceived Usefulness*

As illustrated in Table 12, the correlation value or relation between the independent variable (perceived usefulness) and dependent variable (intention to use) was shown by R^2=0.489, which meant that perceived ease of use had about 48.9% of influence on intention to use.

From Table 13, perceived usefulness had a significant influence on intention to use based on the significance value p=0.000, which resulted in p<0.05.

From Table 14, it can be observed that t=8.120, with significance value p=0.000, p<0.05. Therefore, H3 was accepted. The perceived usefulness variable had a significant influence on intention to use.

Table 13
ANOVA regression result for H3

ANOVA (Dependent Variable: *Intention to Use)*					
Model	Sum of Squares	df	Mean Square	F	Sig.(p)
Regression	521.245	1	521.245	65.933	.000[a]
Residual	545.488	69	7.906		
Total	1066.732	70			

a. Predictors: *(Constant), Perceived Usefulness*

Table 14
Coefficients regression result for H3

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig. (p)
	B	Std. Error	Beta		
(Constant)	6.127	3.035		2.019	.047
Perceived Usefulness	.541	.067	.699	8.120	.000

a. Dependent Variable: *Intention to Use*

The summary of results of the three-hypotheses testing is as follows:

i) H1: Perceived ease of use had a significant effect on the perceived usefulness of DPRS – supported with p<0.05.
ii) H2: Perceived ease of use had a significant effect on the intention to use DRPS – supported with p<0.05.

iii) H3: Perceived usefulness had a significant effect on the intention to use DRPS – supported with $p<0.05$.

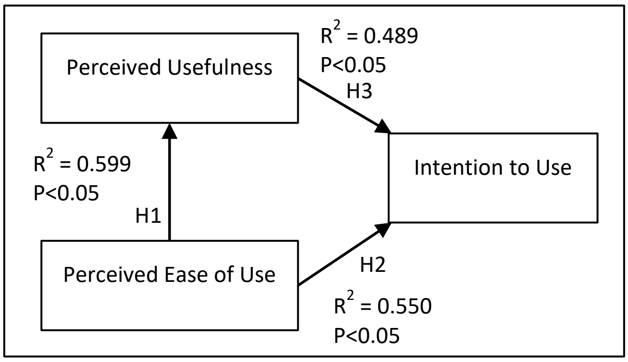

Fig. 5. Result of regression analysis

Figure 5 summarises the results of the regression analysis with the correlation and relation between the independence variable and the selected dependent variable, as shown by the arrow that indicates $p<0.05$. All hypotheses to validate the TAM model for DPRS acceptance were accepted.

This study utilised TAM as a theoretical model to understand and explain the behavioural intention to use DRPS. This meant that DPRS user acceptance was evaluated well through users' behavioural intention to use, supported by the strong significant influence from perceived usefulness and perceived ease of use. The influence factor, R^2 for the three hypotheses was in line and consistent with that of previous study. The variable in H1 (perceived ease of use) had 59.9% of influence on perceived usefulness, as compared to Davis [13] 40% and Masrom [15] 55.8%. The variable in H2 (perceived ease of use) had 55% of influence on intention to use and consistent with [19] that observed 50%. Meanwhile, the variable in H3 (perceived usefulness) had 48.9% of influence on intention to use. Although it had a lower rate, it was in line with the values obtained by other researchers, such as Davis[13] 36.1%, Masrom [15] 39.9% and Surachman [19] 49.9%. Another study Ali Khan *et al.*, [20] observed 48.5% of influence (overall) from multiple independent variables including perceived usefulness and intention to use. Studies by Jin *et al.*, [14] and Asadi *et al.*, [22] concluded that perceived usefulness and perceived ease of use had significant influence on intention to use.

Based on the observation on respondent tabulation, most respondents belonged to the middle management category, which can be obtained by looking into the description of their age range, education level and work experience. At this mid-level management, most participants showed a keen interest in the quest for understanding and realising this new planning system. The experienced personnel had higher behavioural tendency to implement the new technology and they were more rational and confident for that [18]. The acceptance level of DRPS implementation in the shipyard was also high with the significant relationship of TAM constructs in the data analysis.

4. Conclusions

This paper presents the use of TAM to explain the acceptance of DPRS implementation in a leading naval shipyard in the country. The cooperation between the employees and researcher was the key factor for the success of this case study. The results confirmed that TAM can be used to validate employee acceptance of DRPS in the shipyard. Moreover, the researcher found a significant change in employee attitude and behaviour to interact with the new application of DRPS. They also showed great interest to support the system. Attitude was measured by understanding the elements in perceived usefulness and perceived ease of use of the system. Furthermore, the rise and change in attitude were found to affect intention to use. The more the interest to use the system, the more the intention to accept, access and utilise the system. The accessibility factor of DRPS in the shipyard, based on Park [16], was the degree of ease, where employees can access and use the DRPS system in daily shipyard project operation.

The factor that encouraged employees to use DRPS effectively was ease of use in system use. In other words, the ease of access and encouragement given by the system. The usefulness factor of using DRPS can be elaborated by the benefits gained from this system. It encouraged the employees to use the system in the future [25]. This finding explained the need to highlight the desire for technology when researching for new technologies while using TAM. With the rapid development of computer aided technology in the industry, TAM will not only focus on information technology related to the community but also on industrial-based technology, such as manufacturing and engineering. The researcher believed that, "in the engineering field, we run up against difficult problems over and over again, but we need to overcome them one by one".

Training, information session and further learning process to improve and extend the new system are needed as proposed by previous studies Masrom [15], Park [16] and Mekhzoumi *et al*., [24]. In the case of DPRS application for the first time in the shipyard, extensive training and practical session were conducted to keep employees motivated and think positive of the new technology applied. Continuous improvement on human development and skill will enhance the frequent usage of DRPS in future project undertaken at the shipyard.

At the end of the case study, the ship was delivered to the client on time with all the employees involved, including planning teams, engineers and managers who had worked hard and showed great motivation and good execution of DRPS within the time frame. With the successful delivery of the second ship on time, the shipyard was able to recover the overall project delay and avoid the RM63 millions of liquidated damage penalty from the government. This showed that the DPRS implementation in the execution tested in the case study was effective. The changes in employees' work behaviour and the new value-added planning system approach drove the shipyard to success. This study finally concluded that the employees as system users showed a high degree of DPRS acceptance. They felt confident with the system and appreciated its contribution as an effective planning tool for the shipyard.

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