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The study of how to useability technology of warehouse management system (WMS) for increasing efficiency in Map ta phut Industrial Estate

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Abstract

WMS (Warehouse Management System) is a warehouse management system that can help make the warehouse more efficient, thus becoming one of the most important systems in the warehouses of various enterprises, and the WMS system should be implemented the enterprise for improving the efficiency of the organization. The population used in this study included: 78 establishments in Map Ta Phut Industrial Estate, and 66 companies of the sample size. The research instrument was a questionnaire collecting data by mail questionnaire. The statistics used were percentage, mean, standard deviation, t-test Anova, and analyze the difference in pairs with Scheffe Analysis. Moreover, statistical analysis was performed using SPSS program, and this research was statistically significant at .05 level. The results of the study were as follows: 1) Overall, according to the comments on warehouse management and technology adoption influenced the use of warehouse management technology (WMS), indicated that male respondents were very satisfied equal to female respondents. 2) Overall, according to age, found that respondents aged 30-35 were most satisfied. 3) Overall, according to education, revealed that undergraduate were most satisfied. 4) Overall, according to work experience, indicated that respondents with more than 10 years of experience were most satisfied. 5) Overall, according to position, found that the transportation manager were the most satisfied.

Keywords: WMS, Competition in the industry, Efficiency, Industrial Estate.

INTRODUCTION

At present, the competition in the industrial sector has become more intense. causing the organization to turn its attention to the development of operations to be as low as possible to create competitive advantages. The organization has turned to technology to help manage the activities of the organization. In particular, the use of technology helps to reduce costs associated with logistics activities, such as transportation costs. Storage and distribution costs, operating costs, etc. The technology that most people know and are familiar with is barcode technology. Industry and services use RFID, or Radio Frequency Identification technology, which is used instead of the barcode system due to some functional limitations of barcode technology. The advantage of RFID technology that has an advantage over barcode technology is that the RFID system can read and record data (Read and Write) and can also be edited repeatedly, resulting in cost savings. Moreover, the RFID system has a longer reading distance than the barcode system, and the tag of the RFID system is designed to be encapsulated in a durable material, while the barcode system's image data is exposed to moisture or scratches. It will make reading the barcode impossible, or an error will occur. And most importantly, the

RFID system is more accurate and accurate in reading data. The average RFID system is up to 99.5%, while the barcode system is up to 80%, so large enterprises in the industrial sector are increasingly turning to RFID technology. For example, Thai Tank Terminal Company Limited, which operates ports and terminals, is increasingly turning to RFID technology. Liquid chemical storage. Located in Map Ta Phut Industrial Estate, Rayong Province, has introduced RFID technology to help manage chemical trucks.

The technology that most people know and are familiar with is barcode technology, but at present, the technology that is gaining attention and is widely used in both industrial and service sectors is RFID technology, or Radio Frequency Identification. which is used instead of the barcode system due to some functional limitations of barcode technology. The advantage of RFID technology that is advantageous to barcode technology is that the RFID system can read and record data (Read and Write) and can also be edited repeatedly, resulting in cost savings. Moreover, the RFID system has a longer reading distance than the barcode system, and the tag of the RFID system is designed to be encapsulated in a durable material, while the barcode system's image data is exposed to moisture or scratches. It will make reading the barcode impossible, or an error will occur. And most importantly, the RFID system is more accurate and accurate in reading data. The average RFID system is up to 99.5%, while the barcode system is up to 80%, so large enterprises in the industrial sector are increasingly turning to RFID technology. For example, Thai Tank Terminal Company Limited, which operates ports and warehouses, is increasingly turning to RFID technology. Liquid chemical storage. Located in Map Ta Phut Industrial Estate, Rayong Province, has introduced RFID technology to help manage chemical trucks. The technology that most people know and are familiar with is barcode technology, but at present, the technology that is gaining attention and is widely used in both industrial and service sectors is RFID technology, or Radio Frequency Identification. which is used instead of the barcode system due to some functional limitations of barcode technology. The advantage of RFID technology that is advantageous to barcode technology is that the RFID system can read and record data (Read and Write) and can also be edited repeatedly, resulting in cost savings. Moreover, the RFID system has a longer reading distance than the barcode system, and the tag of the RFID system is designed to be encapsulated in a durable material, while the barcode system's image data is exposed to moisture or scratches. It will facilitate the reading of the bar code. can't read or an error occurred. And most importantly, the RFID system is more accurate and accurate in reading data. The average of the RFID systems is as high as 99.5%, while the barcode system is at 80%. Therefore, large enterprises in the industrial sector are increasingly turning to RFID technology. For example, Thai Tank Terminal Company, Ltd., which operates a port and liquid chemical storage facility, is one such example. Located in Map Ta Phut Industrial Estate, Rayong Province, has introduced RFID technology to help manage chemical trucks. 5%, while the barcode system is 80%, so large enterprises in the industrial sector are increasingly turning to RFID technology. For example, Thai Tank Terminal Company Limited, which operates ports and warehouses, liquid chemical storage. Located in Map Ta Phut Industrial Estate, Rayong Province, has introduced RFID technology to help manage chemical trucks.

LITERATURE REVIEW AND HYPOTHESIS:

Concept of efficiency

In a narrow sense, efficiency in business management implies lowering the cost of manufacturing, according to Peterson (1953). It also refers to the quality of productivity and productivity in a broader sense. The most efficient business processes are those that are deemed to be the most efficient. to be able to provide the number and quality of items or services required at a reasonable and minimal cost

In terms of efficiency, John D. Millet (1954) argued that efficiency is the outcome of human-pleasing performance that generates profits.

In a similarly to Millet, Herbert A. Simon (1960: 80) stated that the most efficient work was Let's look at the relationship between inputs and outputs. As a result, efficiency, in this view, is equal to output minus inputs, and it is the government's and government organizations' service. should be upbeat about the service recipient's pleasure In addition, Ryan and Smith (1954: 276) discussed a person's efficiency. It is a positive relationship with things that are dedicated to the job. It is a positive relationship with things that are dedicated to the job. It is a positive relationship with things that are dedicated to the job. It is a positive relationship with things that are dedicated to the job. It is a positive relationship with the efficiency of the work in addition to the aspects of the individual's work by comparing it to what is given to the job.

The meaning of the word is discussed by Peeterson and Plowan (quoted in Tiratchaya Phiphatphen, 2014: 13).

Research hypothesis

Main Assumption 1 Factors in various fields affect the efficiency of using RFID technology in logistics management.

Hypothesis 1.1 The perceived benefit factor affects the efficiency of using RFID technology in logistics management.

Hypothesis 1.2 Technology acceptance affects the efficiency of using RFID technology in logistics management.

Hypothesis 1.3 Ease of use affects the efficiency of using RFID technology in logistics management.

Hypothesis 1.4 Responsiveness affects the efficiency of using RFID technology in logistics management.

Hypothesis 1.5 Reliability affects the efficiency of using RFID technology in logistics management.

Hypothesis 1.6 Cost management affect the efficiency of using RFID technology in logistics management.

Hypothesis 1.7 The satisfaction affects the efficiency of using RFID technology in logistics management.

From the literature reviews. The composition can be summarized as shown in Table 1 and Figure 1

Table 1: *Summary of literature review in each factor*

Observed variables	**References**
Perceive Usefulness, Technology Acceptance	Roger (1971), Foster (1973), Ajzen (1991), Davis et al. (1989)
Service Quality	DeLone and McLean (1992), Parasuraman et al. (1990)
Cost management	Schmelze et al. (1996)
Satisfaction	Lock (1984), Phillip B. Applewhite (1965), Benjamin B. Wolman (1973), Risser (1975), Campbell (1976), Donabedian (1980)
Efficiency	John D. Millet (1954), Herbert A. Simon (1960), Ryan and Smith (1954), Peeterson and Plowan (2557)

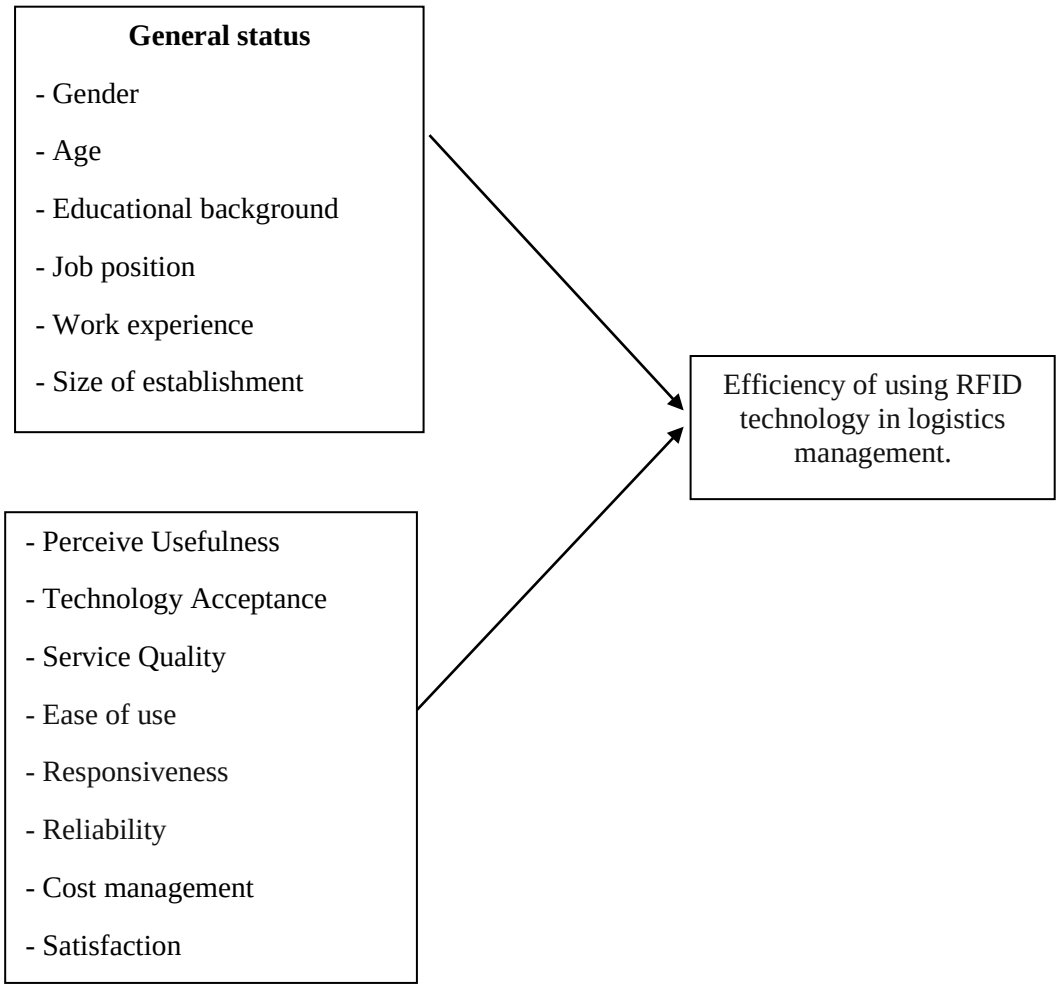

Figure 1: *Conceptual framework and variable component with hypotheses*

METHODOLOGY:

A study on the effectiveness of RFID technology in the Map Ta Phut Industrial Estate's logistics management. The following is the study's structure:

1. Document information analysis It compiles data from concepts, theories, studies, books, tables, articles, and other sources. Questionnaires and conceptual frameworks will be created with this software.

2. Conducting exploratory research because the Map Ta Phut Industrial Estate group can also be divided into 6 sub-industries, the researcher divided the number of group sizes using a method of selecting a sample group using the principle of Probability Sampling type of Stratified Sampling. The samples were drawn by settlement group based on the population proportion of that settlement group. In order to disseminate knowledge and be efficient.

Population and sample

The population of this research is 116 companies in the Map Ta Phut Industrial Estate, comprising Map Ta Phut Industrial Estate 57 companies., Port Industrial Estate 9 companies, Hemaraj Eastern Industrial Estate 34 companies, Asian industrial estates 7 companies, Pha-Daeng Industrial Estate 3 Companies and R.I.L. Industrial Estate 6 Companies (Ref. Industrial Estate Authority of Thailand, 2021) The sample group of this research The sample size was calculated according to Taro Yamane's ready-made table (Thanin, 2017: 49) at 95% confidence level and ±5% error value, yielding a total sample size of 89 companies.

Table 2: *The population have 116 companies in the Map Ta Phut Industrial Estate Group*

List	Mata Phut Industrial Estate	Hemaraj Industrial Estate	Port Industrial Estate	Asia Industrial Estate	Pha-Daeng Industrial Estate	RIL Industrial Estate
Population in each estate	57 companies	34 companies	9 companies	7 companies	3 companies	6 companies

RESULTS AND DISCUSSIONS:

The results of the analysis of information about the general status of the respondents

The results of the study of the general status of the respondents were gender, age, educational background, job position, work experience, number of personnel in the organization. The results of the study were as follows:

Table 3: *General information of sample*

Description		**Frequency**	**%**
sex	males than females	49	55.10 %
	males than females	40	44.90 %
	Total	**89**	**100 %**
age	Less than 25-year-olds	38	38 %
	25-36-year-olds.	31	34.80 %
	37-45-year-olds.	16	18.00 %
	More than 46-year-olds	4	4.50 %
	Total	**89**	**100 %**
Education background	below bachelor's degree	19	19 %
	bachelor's degree	49	55.10 %
	higher bachelor's degree	21	23.60 %
	Total	**89**	**100 %**
job position	Operation Level/Supervisor	69	69 %
	Department Manager/Department Manager	14	15.70 %
	senior management	6	6.70 %
	Total	**89**	**100 %**
work experience	under 5 years	69	69 %
	5 – 10 years	27	30.30 %
	more than 10 years	12	13.50 %
	Total	**89**	**100 %**
Number of	1-50 people	29	29 %

Description		Frequency	%
personnel in the organization	51-200 people	46	51.70 %
	200 people or more	14	15.70 %
	Total	**89**	**100 %**

The study's findings revealed that there were more males than females in terms of sex. Less than 25-year-olds were the most common age group, followed by 25-36-year-olds. holding the highest bachelor's degree, then another bachelor's degree, and so on Position The most work experience is at the operational level/supervisor, followed by department manager/department manager job experience. Having a maximum of 5 years of work experience, followed by 5 - 10 years in terms of the number of employees in the firm. The organization employs 51 to 200 individuals, with 1 to 50 people following closely behind.

Table 4 : *Show mean, the standard deviation of the factors of Perceive usefulness and Technology acceptance of use RFI D Technology in logistics management (N=89)*

Assessment list	$\bar{x}$	S.D.	Results	Rank
Perceive usefulness	3.24	0.50	Moderate	2
Technology acceptance	3.44	0.60	high level	1
Total	3.34	0.56	Moderate	

The results of the study on the perception of benefits and acceptance of the use of RFID technology in logistics management found that the overall two aspects had a moderate opinion, with a mean of 3.34 standard deviations. 0.56 In each aspect, it was found that the highest aspect was the acceptance of the use of technology with a high level of opinion and a mean of 3.44, followed by the perception of benefit, with a moderate level of opinion and has an average of 3.24.

Table 5 : *Show Mean The standard deviation of the factors affecting the efficiency of use. RFI D Technology in Logistics Management (N=89)*

Assessment list	$\bar{x}$	S.D.	Results	Rank
Ease of use	3.40	0.49	Moderate	1
Responsiveness	3.22	0.66	Moderate	2
Reliability	3.00	0.67	Moderate	4
Cost management	2.66	0.58	Moderate	5
Satisfaction	3.04	0.84	Moderate	3
Overall	3.06	0.70	Moderate	

The overall perspective of the 5 elements was modest, with a mean of 3.06 and a standard deviation of 0.70, according to the findings of the study on factors affecting the efficiency of using RFID technology in logistics management. The aspect of ease was found to be the most important in each category. There are mixed feelings concerning its application. with a 3.40 average, followed by a quick reaction with a moderate view. and an average of 3.22, The level of satisfaction was moderate. On the reliability front, the average was 3.04, indicating a modest opinion. had an average of 3.00, with a modest opinion on the cost management element. and had an average of 2.66, respectively.

Table 6 :*Shows the coefficients to test the relationship between factors affecting the efficiency of using RFID technology in logistics management.*

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**			**Tolerance**	**VIF**
1 (Constant)	-.026	.266		-.096	.924		
Perceive usefulness	-.303	.092	-.284	-3.301	.001	.169	5.902
Technology acceptance	.257	.093	.257	2.757	.007	.145	6.913
Ease of use	-.043	.021	-.074	-2.026	.046	.936	1.068
Responsiveness	.655	.058	.684	11.264	.000	.340	2.945
Reliability	.437	.130	.352	3.357	.001	.114	8.791
Cost management	.303	.202	.217	1.497	.138	.060	16.769
Satisfaction	-.315	.206	-.231	-1.530	.130	.055	18.240

Note: Statistical significance level at 0.05*

Statistical significance level at 0.01**

The results of the analysis of the relationship between various factors that resulted in the efficiency of using RFID technology in logistics management found that multicollinearity problems occurred. In terms of cost management and satisfaction, with tolerance values of.060 and.055 0.10 and VIF values of 16.769 and 18.240 10, the researcher did not take independent variables in cost management and satisfaction for analysis. Multiple regression and testing the influence of independent variables, i.e., factors in various aspects, namely, perceived benefits, technology acceptance Ease of use, fast response and reliability affect the efficiency of using RFID technology in logistics management

Table 7 : *Results of the test coefficients for the relationship between factors affecting the efficiency of using RFID technology in logistics management. (after updating the model)*

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**			**Tolerance**	**VIF**
1 (Constant)	-.015	.219		-.069	.945		
Perceive usefulness	-.307	.091	-.288	-3.366	.001	.172	5.809
Technology acceptance	.166	.072	.166	2.306	.024	.244	4.098
Ease of use	-.041	.021	-.071	-1.951	.054	.940	1.064
Responsiveness	.656	.057	.685	11.433	.000	.350	2.854
Reliability	.517	.114	.416	4.516	.000	.148	6.752

Note: Statistical significance level at 0.05* Statistical significance level at 0.01**

Table 8 : *Describing the selection of independent variables to test the influence of factors influencing the efficiency of using RFID technology in logistics management.(after updating the model)*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.946	.896	.889	.20741	.896	142.274	5	83	.000*	1.963

Factors in various fields include the perception of benefits, Perceive usefulness, Technology acceptance, Ease of use , Responsiveness, Reliability influence on the efficiency of using RFID technology in logistics management in terms of fast response. The influence on the efficiency of using RFID technology was the highest, followed by reliability, adoption of the technology, and perceived benefits, respectively. It had a statistically significant effect on the efficiency of using RFID technology in logistics management by 88.9%, at 0.05.

DISCUSSION

An investigation of the level of understanding and acceptability of RFID technology in management. The logistics of businesses in the Map Ta Phut Industrial Estate were found to have a high degree of acceptance, with the most adoption of RFID technology in the workplace, followed by the fact that RFID technology may help your business reach its objectives.

1. In terms of acceptance, it was discovered that there was a high level of acceptance, with the adoption of RFID technology in the workplace receiving the most acceptability, according to Foster's (1973) idea of acceptance, which defined acceptance as persons' willingness to accomplish something. It is learnt through education, through the process of self-awareness and acceptance that can only happen through self-learning, and learning will only be effective if the person has worked to ensure that technology is used properly. That will undoubtedly be advantageous. As a result, the researcher views acceptance of RFID use to be a factor that adds to logistics management efficiency.

2. Viewpoint It was discovered that the perception was mild. RFID technology can help you save money in the long run. Second, RFID technology can assist you in meeting consumer requests in a timely manner, in accordance with Ajzen (1991) and the task. Thiyada Jaimaikram's research (2015).

3. In order to determine the amount of factors affecting the effectiveness of adopting RFID technology in the logistics management of businesses in the Map Ta Phut Industrial Estate, the following aspects were investigated: Accept the perception of ease of use. satisfied with a quick response trustworthiness Only four criteria, including the quick response factor, were discovered to influence the efficiency of adopting RFID technology in logistics management in terms of cost management. It has the most impact on the criteria of efficiency and dependability. impacting the effectiveness of a secondary level Factors Affecting Technology Adoption and Benefits Perceived

4. The quick response factor was found to have the greatest influence on efficiency, which is consistent with Parasuraman et al. In this case, the researcher will refer to As a result of the use of RFID technology, Parasuraman et al. (1990) stated that services can be measured by the gap between services that are actually received. According to the researcher, the quick response factor has a significant impact on the efficiency of RFID technology in logistics management, which is consistent with the findings of Thongchai Surinwarangkoon (2012). 5. Reliability factor It was found that the influence causes the efficiency to be inferior to the next level. This is in line with the concept of Parasuraman et al. In this case, the researcher will refer to As a result of the use of RFID technology, Parasuraman et al. (1990) stated that services can be measured by the gap between services that are actually received. The expectation of receiving services on the basis of trust and reliability is the ability to provide service as promised on the basis of accuracy. Therefore, the researcher believes that the reliability factor affects the efficiency of using RFID technology in logistics management. and may result in operators using RFID technology instead of other technologies. It can also make technology users more confident in this technology because the results are effective, meet their needs, and the organization can achieve the goals that are set as needed.

CONCLUSIONS

The study's findings revealed that there were more males than females in terms of sex. Less than 25-year-olds were the most common age group, followed by 25-36-year-olds. holding the highest bachelor's degree, then another bachelor's degree, and so on Position The most work experience is at the operational level/supervisor, followed by department manager/department manager job experience. Having a maximum of 5 years of work experience, followed by 5 - 10 years in terms of the number of employees in the firm. The organization employs 51 to 200 individuals, with 1 to 50 people following closely behind. Only four criteria influence the efficiency of implementing RFID technology in logistics management, according to the sub-hypothesis testing.

Future research suggestions

1. This study should be replicated in other industrial areas. To improve the efficiency of the businesses and to compare them to those that make a lot of money. To serve as a model for enhancing the effectiveness of the establishment's logistics management.

2. Separation of industries to investigate the differences in how effective RFID is for each type of application.

3. The data collected through questionnaires should be investigated. and seek advice from the warehousing department's manager Interviewing as a qualitative measuring tool was used by the deputy warehouse manager, as well as the warehouse manager.

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