

FACTORS INFLUENCING THE EFFECTIVENESS USING QR CODE SYSTEM TO MANAGE EQUIPMENT FOR SCIENCES'S LABORATORY OF THE COLLEGE OF ALLIED HEALTH SCIENCES, SUAN SUNANDHA RAJABHAT UNIVERSITY

PHANNEE ROJANABENJAKUN^{1*}, JATUPORN OUNPRASERTSUK², PASIKA PANAPRUEKPAI³, TIPVARIN BENJANIRAT⁴ and KRIENGKRAI SAWETSENEE⁵

^{1, 2, 3, 4, 5} College of Allied Health Sciences, Suan Sunandha Rajabhat University, Samut Songkram Province, Thailand. *Corresponding Author Email: phannee.ro@ssru.ac.th

Abstract

Background – Colledge of Allied Health Sciences, it's one of the educational institutions that provide teaching and learning in Health Sciences and Medical and Public Health Sciences. The one part of responsibility was to control document, by store equipment's that were important to the operation in computer system. From this action cause taking more time finding a large number of equipment's. Therefore, to find a solution to solve the problem by use QR code technology to manage all equipment's in order to reach the effectiveness control system. **Objective** - This research aimed to 1) create QR code system to manage equipment for Laboratory of Sciences 2) study level of perception, acceptance and effectiveness of using QR code system and 3) study Influencing of acceptance, perception toward the effectiveness the of use QR code system. **Methods** - The target group was 60 persons collected by simple random sampling with action research. The research referred to a quantitative technique that analysed data using descriptive statistics, inferential statistics, and multiple regression analysis. **Results** - The findings indicated that the created QR code system to manage equipment for Laboratory of Sciences was in good condition. Then, to prove that the perception, acceptance and effectiveness of use QR code system were in the highest level. Furthermore, the Influencing of acceptance, perception revealed that affected the effectiveness of using QR code system, especially, convenience, difference, benefit and the supporting from management, respectively. **Conclusion** - Findings in this research can effectively implement the QR code system to manage equipment for Laboratory of Sciences with in good action and more benefit the perception, acceptance and effectiveness for work. Furthermore, its ability to trace back and tracking all value added data. So, the QR code system was more benefit to arrange in the management system for tracking and traceability for equipment.

Keywords: QR code System, Effectiveness, Equipment

Background

The concept of using technology to help facilitate the work and the use of documents within organizations, documents must be registered in order to be current active documents and they are updated for use in operations and in accordance with operation model as much as possible. (Shejul AA, Thete MR, Shinde NA, 2015) Currently, some organizations must have a document control department registered according to different numbers and conditions in order to comply with the system, in which the organizations have many internal documents, divided by departments according to operations which makes it difficult to control and modify those documents, that cause suffering to find its documents, consuming waste of paper and filing

more cabinets. (Frusman P, Wibison D.So, 2018) in the educational institutes that manage teaching, there are many teaching materials and equipment. (Patipan Kittinantawat, 2020).

Colledge of Allied Health Sciences, it's one of the educational institutions that provide teaching and learning in Health Sciences and Medical and Public Health Sciences. The one part of responsibility was to control document, (Areerat Meyen & et al., 2018). By store equipments that were important to the operation in computer system (Jesada Poacheen and Ruchroj Krewurai, 2020) (Paradon Reechaipichitkul, Nakorn Saison and Tnapon Kongsantae, 2016). From this action cause taking more time finding a large number of equipments. Therefore, to find a solution to solve the problem by use QR code technology to manage all equipments in order to reach the effectiveness control system.

Methodology

This research employed the quantitative technique and action research to create QR code system to manage equipment for Laboratory of Sciences, measure level of perception, acceptance and effectiveness of using QR code system and measure Influencing of perception, acceptance toward the effectiveness the of use QR code system with Pre-Post action

The target group was 60 persons collected by simple random sampling with action research, to set with Pre-Post data with QR Code system. Then, the research referred to a quantitative technique that analysed data using descriptive statistics, inferential statistics, and multiple regression analysis.

Data analysis

The research analysed demographic characteristics by the descriptive statistics such as percentage, mean, standard deviation to create QR code system to manage equipment for Laboratory of Sciences by 2 dimension barcode setting, then, studied the level of degree of the level of study level of perception, acceptance and effectiveness of using QR code and study Influencing of perception, acceptance toward the effectiveness the of use QR code system. (Wachira Khinnongchok, 2010)

Results

The findings indicated that most of the research respondents were female (85.2%) to be an officer (45.90 %) aged between 20 – 29 years old (37.70 %). Most of them had an educational background in bachelor's degree (80.30 %) with work experience in basic computer (73.80 %)

As the result, the created QR code system to manage equipment for Laboratory of Sciences was in quite good condition. Then, after post action to prove that the perception, acceptance and effectiveness the of use QR code system were in the highest level. Furthermore, the Influencing of perception, acceptance revealed that affected the effectiveness of using QR code system, especially, convenience, difference, benefit and the supporting from management, respectively. So, the QR code system was more benefit to arrange in the management system for tracking and traceability for equipment. See Table 1.

Table 1: To create QR code system to manage equipment for Laboratory of Sciences





QR cord (2 dimation barcode)	Result
	Name : Body Model Number:SS.07.56.01.0002/62 – SS.07.56.01.0005/62 Received Date : Nov 2' 2561 Status : Abale to use Budget : 45,000 Baht Work Order : 503FAI262020026 Place : Room 2401 Anatomy Response By: Aj. Sureewan Sriladloa
	Name : Skeleton Model Number : SS.07.56.02.0001/62 Received Date : Nov 2' 2561 Status : Abale to use Budget : 34,000 Baht Work Order: 503FAI262020008 Place : Room 2401 Anatomy Response By: Aj. Kittisak Kaochansak
	Name : Brain Model Number : SS.07.56.15.0001/62 – SS.07.56.15.0002/62 Received Date : Nov 2' 2561 Status : Abale to use Budget : 20,000 Baht Work Order: 503FAI262020028 Place : Room 2401 Anatomy Response By: Aj. Sureewan Sriladloa
	Name : Female Model Number : SS.07.56.01.0010/62 Received Date : Mar 18' 2562 Status : Abale to use Budget : 4,800,000 Baht Work Order: 503FAI662070001 Place : Room 2401 Anatomy Response By: Aj. Sureewan Sriladloa

Table 1 showed that create QR code system to manage equipment for Laboratory of Sciences to contain with name, number, received date, status, budget, work Order, place, room and responsible person.

After that, to continue analyze the perception, acceptance and the effectiveness of use QR code system. As following table 2, 3 and 4.

Table 2: Study level of perception of using QR code system after implemented (n = 60)

Level of Perception	Mean (\bar{x})	Standard Deviation (S.D)	Score
Part 1 Convenience of the QR code system			
1. Help reduce work in process	4.83	0.41	highest
2. Help make the operation uncomplicated	4.81	0.42	highest
3. Help make the operation easier	4.78	0.45	highest
4. Help operate more convenient and faster	4.83	0.37	highest
Part 2 QR code security			highest
1. To access data based on user	4.78	0.48	highest
2. To access data with authorize person	4.75	0.47	highest
3. To access data with password required	4.81	0.46	highest
Part 3 Difference from the old system			highest
1. Speed of recording, editing and data deletion	4.75	0.50	highest
2. Speed of finding data	4.77	0.49	highest
3. Speed of present data	4.85	0.35	highest
4. Fast to response all data	4.86	0.38	highest
Part 4 Data accuracy			
1. The information received is correct and complete	4.81	0.46	highest
2. The scanned QR code is clear and easy to scan	4.85	0.40	highest
3. Intend to continue to use the QR code system in the future	4.83	0.37	highest
4. Aim to use the QR code system as much as possible	4.78	0.41	highest

Table 2 showed that the perception of using of QR code in excellent level, most of them stay at 4.81, majority in help reduce work in process, followed by Help operate more convenient and faster. Then, part 2 showed that the average was 4.78, majority in fast to response all data, part 3 showed that the scanned QR code was clear and easy to do and intend to continue to use it in the future and solve the problem and continue to use the information system and part 4

Table 3: Study level of acceptance of using QR code system (n = 60)

The acceptance of using QR code system	Mean (\bar{x})	Standard Deviation (S.D)	Score
Part 1 Acceptance the benefits of using the QR code system			
1. Help improve operational efficiency	4.86	0.34	highest
2. Help get information very fast	4.81	0.38	highest
3. Help get the right news and reliable data	4.83	0.41	highest
4. Have benefit to decision making	4.86	0.38	highest
5. Have more time to do other tasks.	4.90	0.35	highest
Part 2 acceptance of using QR code system			highest
1. Recommend your colleagues to use a simple QR code system.	4.77	0.46	highest
2. Will intent to uyse QR code due to easement	4.78	0.45	highest
3. Will use the QR code system in every operation	4.80	0.44	highest
4. Try to use the QR code system	4.85	0.40	highest
Part 3 Attitude to use			highest
1. You are interested and ready to learn when new QR code systems.	4.81	0.38	highest
2. You can solve the problem of using the QR code system and continue to use the information system	4.77	0.46	highest
3. The QR code has a good linkage with the system	4.73	0.51	highest
Part 4 Supporting from Management of equipment			highest
1. The Management haS supporting to use the QR code system	4.68	0.53	highest
2. The management has a good attitude towards using the QR code system	4.75	0.50	highest
3. The management has consider using a QR code system	4.68	0.56	highest

Table 3 showed that the acceptance of benefit using of QR code in excellent level, most of them stay at 4.85, majority have more time to do other tasks, followed by help improve operational efficiency and have benefit to decision making. Then, part 2 showed that the average was 4.80, majority will use the QR code system in every operation, part 3 showed that interested and ready to learn new QR code systems and the management has a good attitude towards using the QR code system for part 4.

Table 4: Level of effectiveness of using QR Code (N=60)

The effectiveness of using QR Code	Mean (\bar{x})	Standard Deviation (S.D)	Score
Part 1 Time to search data			
1. To save more time	4.77	0.49	highest
2. To reduce the steps in the operation	4.80	0.47	highest
3. To reduce time to collect and search data	4.75	0.43	highest
Part 2 Data reliability			highest
1. Have the confidence and trust to use the QR code system.	4.80	0.40	highest
2. To believe in the security of the data.	4.77	0.49	highest
3. The efficiency of the information can be useful	4.73	0.54	highest
4. To have a positive attitude towards the QR code system	4.80	0.40	highest
5. The information is clearly recorded in detail	4.86	0.42	highest
Part 3 Data Persistence			highest
1. The QR code system is accurate	4.73	0.54	highest
2. Can keep the data for a long time	4.75	0.47	highest
3. Capable to use for 24 hours	4.75	0.53	highest
4. The QR code model is durable	4.83	0.45	highest

Table 4 Showed that the satisfaction of part 1 was average at 4.77 in excellent level with to reduce the steps in the operation, then part 2 was 4.79 with excellent level and part 3 was in average at 4.76 with quite high in the durable of data persistence.

Table 5: Personal factor influence in acceptance of using QR code system (N=60)

Measure	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
Constant	4.54	0.23		19.18	0.00
Perception of using QR code system					
1. Gender	-0.16	0.09	-0.19	-1.73	0.08
2. Age	0.07	0.03	0.23	1.99	0.05
3. Education	-0.21	0.07	-0.32	-2.81	0.00
4. Computer Experience	0.17	0.04	0.46	4.04	0.00

Note: P-value <0.05, R=.58, R²=.34, F=7.32

Table 5 The results of the analysis of personal factors influence the acceptance of the use of the QR code system of R² at 0.34, proved that Individual variables influenced the acceptance of QR code usage by 34 percent respectively with age, education and computer experience, but gender was no influence on the acceptance of using the QR code system.

Table 6: Personal factor influence in acceptance of using QR code system)n=60)

Measure	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
Constant	4.41	0.24		17.84	0.00
Acceptance of using QR code system					
1. Gender	-0.13	0.09	-0.15	-1.43	0.15
2. Age	0.09	0.03	0.27	2.34	0.02
3. Education	-0.22	0.08	-0.32	-2.84	0.00
4. Computer Experience	0.18	0.04	0.47	4.16	0.00

Note: P-value <0.05, R=.59, R²=.35, F=7.83

Table 6 The results of the analysis of personal factors influence the acceptance of the use of the QR code system of R² at 0.35, proved that Individual variables influenced the perception of QR code usage by 35 percent respectively with age, education and computer experience, but gender was no influence on the acceptance of using the QR code system.

Table 7: Perception influence to perception of using QR code system (N=60)

Measure	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
Constant	-0.10	0.35		-0.29	0.77
Perception of using QR Code					
1. Convenience of the QR code system	0.36	0.07	0.37	4.91	0.00
2. QR code security	0.04	0.08	0.06	0.52	0.60
3. Difference from the old system	0.04	0.10	0.05	0.45	0.64
4. Data accuracy	0.56	0.11	0.57	5.05	0.00

Note: P-value <0.05, R=.89, R²=.79, F=54.81

Perception the use of the QR code system had influence to acceptance of it with R² was 0.79, showed that, the variable of perception had influence with QR Code system at 79 %, respectively. Besides, the convenience and data accuracy were the main of satisfaction, but the QR Code security (P-value=0.60) and not difference from the old system (P-value=0.60) hadn't influence of the perception of using QR Code.

Table 8: Perception the use of the QR code system had influence to effectiveness of using QR Code system (n=60)

Measure	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
Constant	0.70	0.44		1.56	0.12
Effectiveness of using QR Code system					
1. Convenience of the QR code system	0.24	0.09	0.24	2.59	0.01
2. QR code security	0.15	0.11	0.19	1.35	0.18
3. Difference from the old system	0.51	0.13	0.55	3.80	0.00
4. Data accuracy	-0.06	0.14	-0.06	-0.45	0.65

Note: P-value <0.05, R=.83, R²=.69, F=31.51

The result showed that the perception of using QR Code had influence to the effectiveness of it with R² = 0.69, proved that, the variable of perception of using QR Code had influence to the effectiveness at 69 % respectively, in addition, the convenience and data accuracy were the main of satisfaction, but the QR Code security (P-value=0.18) and not difference from the old system (P-value=0.65) hadn't influence of the perception of using QR Code.

Table 9: Acceptance the use of the QR code system had influence to effectiveness of using QR Code system (n=60)

Measure	Unstandardized Coefficients		Standardized Coefficients	t	p-value
	B	Std. Error	Beta		
Constant	0.67	0.44		1.51	0.13
Effectiveness of using QR Code					
1. Accepting the benefits of using the QR code system	0.48	0.12	0.43	3.96	0.00
2. Acceptance of use	0.03	0.12	0.03	0.27	0.78
3. Attitude to use	0.08	0.12	0.10	0.72	0.47
4. Supporting from management to record data of equipment	0.24	0.09	0.36	2.63	0.01

Note: P-value <0.05, R=.81, R²=.65, F=27.01

The result showed that the acceptance of using QR Code had influence to the effectiveness of it with R² = 0.65, meant that, the variable of perception of using QR Code had influence to the effectiveness at 65 % respectively, in addition, Supporting from management to record data of equipment was the main of satisfaction, but the acceptance of use (P-value=0.78) and attitude to use (P-value=0.65) hadn't influence of the effectiveness of using QR Code.

Discussion

The study aimed to create QR code system to manage equipment for Laboratory of Sciences was satisfaction to users, the QR code system could fully meet the needs of searching information and could find the data which reference. (wanusporn kairaj, 2018). Then, to meet

the highest level of, perception, acceptance and effectiveness of using QR code system, and proved that the QR code system had Influencing of perception, acceptance and effectiveness. (Wachira Khinnongchok, 2010).

So, all results matched with Factors Influencing the Effectiveness Using QR code System to Manage Equipment for Laboratory of Sciences of the College of Allied Health Sciences, Suan Sunandha Rajabhat University

Part 1: As per the research findings, it was found that, overall, the opinion score of perception of using QR Code with more convenience, reduced step of finding report with scored at 4.83 in the highest level

Part 2: The data concerned satisfaction of perception of use QR Code system about convenience found that to reduce step of work at average 4.83 which in the highest, followed by convenience and quite fast of work and not complicate

The safety of QR Code system found that the password was the key of user at score average 4.81 at the highest, followed by the data provided for user and the safety of verifying user which quite the same level

The difference from the old system found that quite fast of response of the overall at score average 4.86 in the highest, followed by very fast of the process data at high level

The accreted data found that quite clear and easy to scan with score average 4.85 in the highest, followed by the objective of use with accuracy data and focus to use

QR Code system at score 4.83 with highest level

Part 3: The result of acceptance to use QR Code system with the benefit of use found that help saving time with mean at average 4.90 in the highest level, then, have more benefit for decision making of tasks, help to get correct and fast information. Furthermore, acceptance of QR Code proved that user agreed to practice the value of new system in order to help work flow with mean at average 4.85, then, to concern the accurate and easy to use QR Code system, so, the user try, intent and advise to the others users to use it (Paradon Reechaipichitkul, Nakorn Saison and Tnapon Kongsantae, 2016)

In the part of attitude of use showed that users were interesting to use new system with mean 4.81 in average at the highest level, followed by try to use it with linking data

In the way of the supporting from management, showed that, the management had agreed to use the value system with mean 4.75 in average at the highest level and try to consider and could get advantage to use it.

Part 4: The satisfaction of the effectiveness of using QR Code concerned with time to search information proved that could reduce the process of work with mean 4.80 in average at the highest level and next, help saving time of searching and keeping data. To concern the accurate data, showed that the data had more distinct and clear, respectively.

The data accuracy showed that had more clearly detail about securement of data and unlimited user and period with mean 4.86 in average at the highest level, next, to have more confidence and trust to use QR Code system.

Conclusion

The result of Factors Influencing the Effectiveness Using QR code System to manage equipment for science's laboratory of the College of Allied Health Sciences, Suan Sunandha Rajabhat University with the hypothesis as following

Hypothesis 1 Personal factor had influence to perception of using QR Code system ($R^2 = 0.34$), as result showed that personal factor had influence at 34 %. Especially, age, education and experience of computer skill conformed to Nantanapat Asanattakorn (2016) which mentioned that age was one of factor in same or difference idea, perception, acceptance. Furthermore, person in difference age had a lot of opinions to convey, but, most of them had the point of perception and acceptance of experience and knowledge in the same or difference way. Then, to focus on gender found that no influence to perception ($P\text{-value}=0.08$) but, not conformed to Intheeya Anpat and Duangdeuan Sastapat (2020) which mentioned that gender was one of factor about biology and society, due to the difference of gender between man and woman in many ways, especially, opinion, attitude, values, behavior and decision making to perception or acceptance of something.

Hypothesis 2 Personal factors had influence to acceptance ($R^2 = 0.35$) proved that Personal factors had influence to acceptance at 35% statistically significant at the 0.05 with age, education and experience of computer accorded with Chanisare Kanjanakin (2016) which said that the difference of age, education and experience of technology and period of work had influence to the technology, followed by Oil company in Kanjanaburi province, but not accorded with gender ($P\text{-value}=0.15$) which hadn't influence with acceptance of using QR Code and had not accorded with Tachapong Sasabud and Akaradej Kedchom (2521), said that gender had influence to acceptance of learning via electronic media. Furthermore, gender had cognitive structures and process in difference way which explained that man had autonomous and more learning than women in computer skill.

Hypothesis 3 Perception had influence to acceptance of using QR Code ($R^2 = 0.79$) proved that the factors of perception of using QR Code had influence with the acceptance at 79% with factor of convenience, accuracy data which accorded with Peter Ferdinand Drucker (1995) said that perception was reality, the truth of things was the perception of them that no one known who they were really of that thing. So the perception is the truth and the validity of that a person is surrounded by stimuli that come from the environment through the senses and communication, but in the security question of the QR code system ($P\text{-value}=0.60$) and the difference from the old system ($P\text{-value}=0.64$) found that had no influence on the acceptance of the QR code system which is inconsistent with Imam, Kamran (2018) which said that the new perception process was a process that began with the recipient receiving sensory stimuli from hearing, smelling, tasting and touching which perception causes exposure and lead to intention and interpretation. (Titiporn Chansirawat & et al., 2020). Furthermore, the factor of

technical factor related to communication, especially, in the matter of creating communication news to create good awareness such as concentration, distinctiveness and novelty. Then, historical experience of each consumer would have a different news-related experience. So, this would result in different perceptions and acceptances.

Hypothesis 4 Perception of using QR Code had influence to the effectiveness ($R^2 = 0.69$) proved that Personal factors had influence to acceptance at 69% statistically significant at the 0.05 with convenience and difference from the old system conformed to Chonlada Prasert-ui. (2014) said that the convenience to access data how easy or difficult for the user adapted to take advantage of the capabilities of the system which concerned the easiness and effectiveness to access data, but, the safety of QR Code system (P-value=0.18) and accuracy data (P-value=0.65) found that had not influence to using QR Code which not accorded with Santi Kobsanith (2018). Furthermore, QR code system was to prevent crime for passengers. Beside, crime prevention need to provide knowledge in order to aware and carefully perform.

Hypothesis 5 Acceptance of using QR Code had influence to the effectiveness ($R^2 = 0.65$) proved that Personal factors had influence to acceptance at 65% statistically significant at the 0.05 the benefits of using the QR code system and support from management to record data accorded with Sakchai Tangwannawit (2012), said that information systems in a business were driven from both internal and external forces that made the organization adapt for survival in order to create an advantage to develop customer relationship including strategy theory, organizational theory, and the study of information systems with successful practices. as well as being a partner of business organizations with concerned data system to manage with automatic decision making and attitude to use which found that hadn't influence to the effectiveness of using QR Code system, in the other hand, not accorded with Somchat Kedpan (2020) said that attitude existed depend on environment and satisfaction (Kanjana Arunsakrujee, 2018). Furthermore, attitude was the characteristics had pre-existing preferences or preferences which caused others to become affectionate action.

Limitation

This research only studied of QR Code in one Educational Institute of Samut Songkhram Education Center should have studied more at the other place and compare results in order to promote the good system Furthermore, to save the time of data searching information and track back data.

Declaration of Conflicting Interest

The author's declare no conflict of Interest.

Acknowledgment

We would like to thank the reviewers for their helpful comments and suggestions to improve our study. Thank you to the College of Allied Health Sciences, Suan Sunandha Rajabhat University, Samut Songkram Province, Thailand for their support.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

References

- Areerat Meyen & et al. (2018). Development of Ddocument Management System Faculty of Science and Technology, University of the Thai Chamber of Commerce. Retrieved September 30, 2021, from <https://scholar.utcc.ac.th>.
- Chanisara Kanjanaratakun (2016). Study of Personal qualities Organizational Environment Factors and Technology Affects the Acceptance of Technology in the Work. Master of Business Administration Bangkok University. Retrieved September 26, 2021, from <http://dspace.bu.ac.th>
- Chonlada Prasert-ui. 2014. Influence of system quality on usability, satisfaction and net benefit of Facebook Line or Instagram application users in purchasing women's fashion clothing. of private university students. Master's degree Bangkok University. Retrieved September 26, 2021. From <https://so05.tci-thaijo.org>.
- Frusman P, Wibison D. Design and
- Implementation of Warehouse Management Improvement Strategy Using Barcode Systems
- Approach at PT LATINUSA TBK, ICTOM 04 – The 4th International Conference on Technology and Operations Management. 2018;
- Intreeya Anphat and Duangduean Satarapat. 2020. Psychological Factors Affecting Acceptance of Sexual Behavior of Adolescent Girls in Khlong Toei Area. Master of Science Program applied psychology St. Louis College. Volume 37, No. 101. Retrieved September 26, 2021. From <https://so06.tcihaijo.org/index.php/JEMEPTB/article/view/243849/165409>
- Jesada Poacheen and Ruchroj Krewurai. (2020). Application of QR code to store equipment information online of the Faculty of Public Health Naresuan University Technology and Communication Education Faculty of Education Naresuan University. Retrieved January 25, 2020, from <https://doi.org/10.14456/jil.2021.15>
- Kanjana Arunsakrujee. (2018). Satisfaction concept. Retrieved January 25, 2020, from <http://maitree3.blogspot.com>.
- Imam K. Personal Health Card: Use of QR Code to Access Medical Data. Master of Science in Computer Science, University of Rhode, Island. 2018; 1-55.
- Neeranuch Pikeaw. (2018). Development of e-books with QR code technology on social media literacy. Journal of Siam Paritas Communication. Department of Educational Technology and Communication Faculty of Industrial Education and Technology King Mongkut's University of Technology Thonburi. Year 20, Issue 1. Retrieved September 26, 2021, from <https://so05.tci-thaijo.org>
- Nontanapat Asawanatakorn. (2016). the perception of public relations communication and factors affecting the decision to choose to study in the Faculty of Business Administration students. Rajamangala University of Technology Thanyaburi. Faculty of Business Administration Rajamangala University of Technology Thanyaburi. Retrieved September 26, 2021, from <http://www.repository.rmutt.ac.th>
- Paradon Reechaipichitkul, Nakorn Saison and Tnapon Kongsantae. (2016). Equipment management system using RFID technology: a case study of the Faculty of Education. Loei Rajabhat University Faculty of Education, Loei Rajabhat University and students of the Bachelor of Education program. Loei Rajabhat University. Academic Journal of Information Technology and Innovation Management. Volume 3, Issue 2. Retrieved September 02, 2021, from <https://ph02.tci-thaijo.org>.
- Patipan Kittinantawat. (2020). Application of innovative QR code to improve Chinese language teaching and learning. Rompruek Journal Krirk University. Faculty of Communication Arts Rambhai Barni Rajabhat University. Year 38, Volume 3. Retrieved November 05, 2021, from <https://scholar.google.com>

- Peter Drucker. (1995). the practice of management. New York: Haper & Row, Publishevs.
- Sakchai Tangwanwit. (2012). Information system strategy and information system plan development. Information Technology Journal. Volume 8, Issue 2. Retrieved January, 2021, from <https://ph01.tci-thaijo.org>.
- Santi Krobsanit. (2019). Development of a QR code system to prevent crime for taxi passengers. Faculty of Police Science Police Cadet School Volume 8, Issue 1. Retrieved November 20, 2021, from <https://so03.tci-thaijo.org/index.php/JIRGS/article/view/229842>.
- Somchat Ketpan & et al. 2020. Attitudes, Perceptions, Behavioral trends and Participation in the Treatment of Witness Objects that Affect the Performance of the Staff of the Disaster Mitigation Foundation. Suan Sunandha Rajabhat University. Volume 8, Issue 5. Retrieved September 05, 2021, from <https://so03.tci-thaijo.org/index.php/journal-peace/article/view/240806>.
- Shejul AA, Thete MR, Shinde NA, Tupe MM. Health Management System Using QR- Code. International Journal of Advance Research and
- Innovative Ideas in Education (IJARIE). 2015;1(4): 408-412.
- Tachapong Satabuth and Akaradej Ketchom. (2021). the causal relationship model of the students' intention to use electronic learning during outbreak of covid 19. Faculty of Management Science Bansomdetchaopraya Rajabhat University. Year 7, No. 2. Retrieved September 26, 2021, from <https://scholar.google.com>