

The Development of Energy Storage Bag Prototype for Securities, Disaster, and in Remote Areas

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Abstract - The research has objectives to study the development of energy storage bag prototype for securities, disaster, and in remote areas; and to compare the differences between expectations and satisfaction from samples. The samples used for the research were soldiers. The results showed that: 1) the results from comparing the differences between expectations and uses of energy storage bag differentiated by demographic factors showed that different gender has different level of expectation from energy storage bag as well as different level of satisfaction. Moreover, different working time affected materials and maintenance with significant difference at significant level of 0.05; 2) the results of comparing the level of satisfaction of energy storage bag differentiated by demographic factors showed that different ages have different level of satisfaction towards energy storage bag. Also, different working time has different satisfaction towards appearance, uses, and maintenance with significant level of 0.05; and 3) the results of comparing differences between expectations and satisfaction towards energy storage bag in each factor showed that there is no significant difference between expectation and satisfaction. However, in material factor, there is a significant difference with the significant level of 0.10 which showed that the level of satisfaction and expectation had no significant difference.

Keywords - Energy Storage Bag

I. INTRODUCTION

Sustainability is one of the five main strategies in strategic planning for 20 years in Thailand. In the present days, Thailand has to face the problems with instability, sustainability within country, and external threats. Moreover, the changes of climate and natural disaster are more intense. Therefore, this project will combine Science and Technology, Research and Innovation to develop the potential to protect the country, as well as developing appropriate equipment and intelligent system to be more efficient which are needed to develop rapidly. Moreover, Thailand needs procedures in preventing natural disaster and climate changes in overall as well as in specific areas.

The duties for soldiers or civilians, and duties for patrol or mitigate the disaster to get into the forest or in the remote areas which leads to dangers to those staff as sometimes they get lost or no electricity available for communication. Siam Technology College (STC), which is the institution that experts in developing energy and brings the potential of energy to use in various ways, has seen the problems for soldiers and decided to develop the prototype of energy storage bag to help soldiers and patrols in duties to work more efficiently and safely.

This research has the objectives to develop the energy storage bag for sustainable duties, natural disasters, and in remote areas. The bag contains 5 main components, including, radio communication, Lithium battery secondary storage, Global Positioning System (GPS), energy harvest system, and bulletproof system. The energy harvest system includes solar cells and Piezoelectric Generator. The prototype of energy storage bag will help decreasing the weight of the backup battery when soldiers have to travel for long time. The lighter weight will help to reduce back stress when soldiers have to travel in long distance. Therefore, the use of Piezoelectric generator will help harvesting energy by kinetic movement or walking and generated to electrical energy.

As mentioned above, researcher and Siam Technology College has seen the problem from soldiers and patrol and decided to develop energy storage bag to help soldiers and patrol to work more efficiently.

II. LITERATURE REVIEWS

This research has main objectives to develop energy storage bag for sustainable duties, natural disaster, and in remote areas. In the bag will include radio communication, Lithium battery secondary storage, Global Positioning System (GPS), energy harvest system, and bulletproof system. The energy harvest system includes solar cells and Piezoelectric generator. The prototype bag will help reducing the weight of backup battery when soldiers need for long time and long distance duties. The reduction of the weight will have reduce back stress to soldiers. Therefore, selecting Piezoelectric generator will have to gather energy from kinetic movement or walking, so the soldiers can use energy more efficiently.

As mentioned above, researcher and Siam Technology College has seen the problem from soldiers and patrol and decided to develop energy storage bag to help soldiers and patrol to work more efficiently.

III. RESEARCH OBJECTIVE

To study the development of energy storage bag for sustainable duties, natural disaster, and in remote areas as well as to compare the differences between expectations and satisfaction of energy storage bag for sustainable duties, natural disaster, and in remote areas.

IV. CONCEPTUAL FRAMEWORK

This research is survey research and factor analysis which focuses on surveying a group of soldiers related to expectations and satisfaction the use of energy storage bag. The tools used for research were questionnaires which was adapted (Sopakdee, K. and Chantuk, T., 2016).

V. DATA

The population and samples for this research were soldiers and staff from department of forestry that receive special duties like patrol, formal warfare, and counterterrorism.

The tools used for data collection were questionnaires developed by the researcher with 3 separated parts, including: part 1 for demographic factors, such as gender, age, educational level, and duties length of time; part 2 for expectations towards energy storage bag for sustainable duties, natural disaster, and in remote areas; and part 3 for satisfaction towards energy storage bag for sustainable duties, natural disaster, and in remote areas.

VI. RESEARCH METHODOLOGY

The data was analyzed by Statistical Package for Social Science (SPSS) by using descriptive statistics, including frequency, percentage, mean, and standard deviation. In order to analyze expectations and satisfaction towards energy storage bag distinguished by demographic factors, the statistics used were inferential statistics, such as t-test, and one-way ANOVA test with Least Significant Difference as well as comparing the differences between expectations and satisfaction towards energy storage bag by using Paired T-Test.

VII. DISCUSSION AND CONCLUSION

The data analysis of level of expectations towards energy storage bag showed that the level of expectations generally was in high level (\bar{x}) = 3.52, S.D. = 0.98. When considering each factor, the results showed that the factor with high level were usage (\bar{x}) = 3.61, S.D. = 1.01, followed by materials (\bar{x}) = 3.51, S.D. = .095, maintenance (\bar{x}) = 3.47, S.D. = 1.01, and appearance (\bar{x}) = 3.45, S.D. = 0.98 respectively.

The analysis of level of satisfaction towards energy storage bag showed that the level of satisfaction was generally in high level (\bar{x}) = 3.53, S.D. = 0.93. When considering each factor individually, the factors in high level were usage (\bar{x}) = 3.58, S.D. = 0.89, followed by materials (\bar{x}) = 3.57, S.D. = .094, maintenance (\bar{x}) = 3.57, S.D. = 0.90, and appearance (\bar{x}) = 3.44, S.D. = 0.95 respectively.

The results for comparing level of expectations towards energy storage bag distinguished by demographic factors showed that different gender had different level of expectations in terms of usage, materials, and maintenance with the significant level of 0.05.

The results for comparing level of satisfaction towards energy storage bag distinguished by demographic factors showed that different age had different level of satisfaction towards energy storage bag generally. Also, different duties length of time had different level of satisfaction towards appearance, usage, and maintenance of the energy storage bag with the significant level of 0.05.

The results of comparison between level of expectations and level of satisfaction towards uses of energy storage bag generally and specifically showed that there was no significant difference in expectation and satisfaction. For each factor specifically, the results showed that there was significant difference for material with the significant level of 0.10 which showed that there was no

difference between expectation and satisfaction for usage.

VIII. DISCUSSION

The results of level of satisfaction towards energy storage bag generally and specifically were in high level. The factor with highest level of satisfaction was usage, followed by materials, and maintenance respectively which was related to the research from Pojtham (2014), the study of design and develop medical equipment bag and field medication equipment showed that the design and develop medical equipment bag and field medication equipment should consider materials and functions for the bag. The materials used were artificial leather sponge which is suitable for developing bags to make them light, flexible, and easy to clean. The materials used for packing box inside the bag should use plastics to make as it has lightweight, easy to clean, and shockproof which was related to the research from Thonisorn et al. (1998), research and development backpack (Special forces) which the results explained that backpack had high satisfaction to users. Also, it can be summarized in general that backpack is suitable for special forces duties as it has needed functions for both training and field.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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