



The knowledge management and the guidelines of learning instruction on emergency medical services by local administrative organizations in northeastern Thailand

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Abstract

This study aims to emergency medical services (EMS) and their efficacy within the purview of Local Administrative Organizations (LAOs) in Thailand. As the responsibility for EMS has transitioned from public hospitals to LAOs, it has prompted inquiries into their efficiency. This research endeavors to scrutinize the determinants influencing the performance of EMS managed by LAOs. To accomplish this objective, we embraced a quantitative research approach. Data was obtained from 636 individuals who had availed emergency medical services, chosen through purposive sampling. Questionnaires were used to collect data, and the IOC index was employed to ensure data integrity. Descriptive statistics elucidated and assessed various variables. Multiple regression analysis was conducted with a statistical significance level of 0.01 to unearth the associations between administrative factors and the performance of EMS by LAOs. This research uncovers a positive, moderate-level correlation between administrative factors and the performance of EMS by LAOs. Specifically, factors such as community engagement, service preparedness, operational efficiency, budget allocation, resource availability, and staffing levels were identified as noteworthy predictors of EMS success by LAOs, explaining 60.8 percent of the variance. The outcomes of this study have practical implications for EMS management by local authorities, not only in Thailand but also in other regions grappling with analogous challenges. This research contributes to the ongoing endeavors to enhance pre-hospital care and emergency response, ultimately preserving lives and mitigating the repercussions of emergency illnesses and accidents on communities.

Keywords: Effectiveness, Emergency medical services, Knowledge management, Learning, Local administrative organizations, Performance.

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Contribution of this paper to the literature

This study distinguishes itself from prior research on Emergency Medical Services by its primary emphasis on the role of LAOs in Thailand. The decentralization policy empowers LAOs to effectively manage their resources to enhance the efficiency of EMS, consequently leading to an improvement in the well-being of citizens.

1. Introduction

According to the 11th National Economic and Social Development Plan (2012-2016), Thailand was developed under a people-centered model to ensure more balanced development based on the sufficiency economy philosophy. One of their strategies was planned to reach sustainable development goals. Unfortunately, the plan has been implemented without integration. There were no practical ways to foster partnership among government agencies, private sectors, and communities. Consequently, to set out development directions and to reach the objectives of security, prosperity and sustainability, there were some changes in terms of a five-year development strategies for the 12th National Economic and Social Development Plan (2017-2021). Nonetheless, with the government focusing on economic development including supporting exports and services, and promoting tourism to increase the number of tourists, the human capital has been continuously exploited. Moreover, the social development, especially people's quality of life, has not been given enough attention (The Prime Minister of Thailand, 2017).

People's ways of life have been heavily affected by such developments. This impact results from either industry pollution or their own farming. Moreover, millions of tourists have flocked to the city or the upcountry thanks to the government's tourism promotion. These movements have negative impacts on people's physical and mental health. They have suffered serious illness which needs medical services and rehabilitation (Jansiri, 2016). The government must develop basic health services to meet people's demands, formulating methods, plans and medical services platforms (Newman, De Zoysa, Newman, & De Zoysa, 2001). In Thailand, local governments are required to follow the policies issued by the central government. A minister assigns the job to the regions through departments so that they can have the same policy across the country. People are only service receivers. Therefore, people in rural areas lack access to the government's basic health services, both in normal medical care and emergency medical services (Chatbanchachai, 1998). Emergency Medical Services (EMS) are necessary and urgent for people who have suffered from serious illness and injuries especially road accidents, which, according to a report, Thailand was second in terms of road accident behind Libya. Emergency Medical Services are basic medical services to which all people should have access (Weiner, Baker, Bernson, & Schuur, 2022). Therefore, the management of emergency medical services should focus on providing immediate medical services for those who, without effective emergency services, can lose their lives or be disabled. In the past, the emergency medical services for people with emergency illness or serious injuries to avoiding losing their lives and disability were the main responsibilities of the National Institute for Emergency Medicine. For local people who want to gain access to the medical services with quality and standard, and for decentralization, the institution decided to transfer their functions to Local Administrative Organizations (LAO) according to the National Institute for Emergency Medicine meeting in 2012. The LAOs are closer to local people and have main functions in improving their quality of life and safety both in normal times and emergency situations. This is in line with the government policy of decentralization from the Ministry, Department and Local Administrative Organization respectively. Unfortunately, the management has not been smooth as expected. Several services including Emergency Medical Services have been plagued with problems. Several staff who are equipped with knowledge and skills are not enough to provide patients with the services. The problems include medical materials, budgets and laws/regulations (Macris, Schilling, & Palko, 2018). Moreover, to run the services effectively, there must be better and closer collaborations between the Emergency Medical Services and other local organizations including Sub-District Health Promoting Hospitals, Community Hospitals, private sectors and community. The objective of this study is to investigate factors influencing performance effectiveness of Emergency Medical Service by Local Administrative Organizations. The findings are presented to involved parties to set out a policy and improve the performance effectiveness of the Emergency Medical Service in the Northeastern Thailand and across the country.

2. Literature Review

"This study is grounded in the concepts of Public Administration, with a particular focus on New Public Management (NPM) and New Public Service (NPS). Government responsibilities encompass various aspects, including public policy development, planning, implementation, and managing processes for the betterment of society. Public policy encompasses diverse areas, such as security and public health services. New Public Management emphasizes the professionalization of organizations, implementing standardized processes and assessments, while also downsizing for improved efficiency. Within the New Public Management framework, there is a strong emphasis on achieving performance objectives and prioritizing the welfare of service recipients. The Ministry of Public Health has adopted the principles of Public Health Administration, applying them to the health service system to benefit the well-being of the populace. New national constitution has generated decentralization policy to all levels of government, therefore public health services especially, EMS has been delegated from Ministry of public health to LAO. There are still questionable with the performance effectiveness of EMS by LAO whether better or not comparing with the previous EMS management by public hospitals. Emergency Medical Services (EMS) refers to a system that provides immediate medical care in emergency situations. EMS is designed to respond to various types

of emergencies, including medical, trauma, and other critical incidents. Here are some key components of emergency medical services:

1. **Emergency Medical Dispatch:** EMS starts with a call to an emergency telephone number, such as 911 in the United States or 112 in many European countries. Trained dispatchers gather information about the emergency and dispatch appropriate resources, including ambulances and other responders.
2. **Ambulance Services:** Ambulances play a crucial role in EMS. They are equipped with medical equipment and staffed by trained paramedics or emergency medical technicians (EMTs) who can provide medical care on-site and during transport to the hospital.
3. **Pre-hospital Care:** EMS providers deliver pre-hospital care, which includes assessing and stabilizing patients at the scene of an emergency. They may administer medications, perform cardiopulmonary resuscitation (CPR), control bleeding, immobilize fractures, and provide other necessary interventions.
4. **Advanced Life Support (ALS):** ALS involves advanced medical procedures and interventions performed by highly trained paramedics. These procedures may include advanced airway management, intravenous medications, cardiac monitoring, defibrillation, and other specialized treatments.
5. **Emergency Departments:** EMS transports patients to hospital emergency departments (EDs), where they receive further medical evaluation and treatment. EDs are staffed by physicians, nurses, and other healthcare professionals who are trained to handle a wide range of emergencies.
6. **Integration with Other Services:** EMS often collaborates with other emergency response agencies, such as fire departments and law enforcement, to ensure a coordinated response to emergencies. This cooperation enables efficient rescue operations, scene management, and patient care.
7. **Medical Direction and Protocols:** EMS systems operate under medical direction, which involves physicians overseeing and providing guidance for EMS personnel. Medical protocols are established to ensure standardized and evidence-based care across EMS providers.
8. **Continuous Training and Quality Improvement:** EMS personnel undergo regular training to maintain their skills and stay updated with the latest advancements in emergency care. EMS systems also have quality improvement programs to monitor performance, identify areas for improvement, and enhance patient outcomes.

It's important to note that emergency medical services may vary between countries and regions due to differences in infrastructure, resources, and healthcare systems. However, the primary goal of EMS is to provide rapid and effective medical care to individuals experiencing emergencies, improving their chances of survival and recovery. In addition, many concepts are deployed in the study. The first one is the principle of Emergency Medical System of which importance is shown (Krohmer, 2005). Its management is also used to determine the variables which were later taken to study and seek ways in increasing the effectiveness of EMS (National Institute of Emergency Medicine, 2015). The second principle is the quality of public service. The importance of public service has been discussed in terms of its main functions and personnel resources. They must realize the quality of public service so that they can develop the organization, which has become the criteria for the evaluation of the effectiveness of the Emergency Medical Service by Local Administrative Organizations. The last one is the concept of effectiveness which is discussed to find ways in improving the effectiveness of the organization. The criteria for the evaluation of effectiveness must be developed to design research tools and set out strategies in increasing the effectiveness of the Emergency Medical Service by Local Administrative Organization.

In addition, based on the concept and related studies, the researchers defined the variables as follows.

- **Independent variables:** Factors of Administration: Context; 1) environment 2) community readiness, Input; 1) personnel 2) budget 3) materials, Process; 1) preparation 2) operation 3) monitoring.
- **Dependent variables:** EMS Effectiveness of LAOs; 1) punctuality 2) equality 3) adequacy 4) consistency 5) progressiveness.

2.1. Conceptual Framework

The conceptual framework of this study follows and is developed based on other scholars' work, related theories, and discussions throughout the literature review to understand the concept of the performance effectiveness of learning strategy instruction on Emergency Medical Services by Local Administrative Organizations as follows.

Figure 1 illustrate Framework.

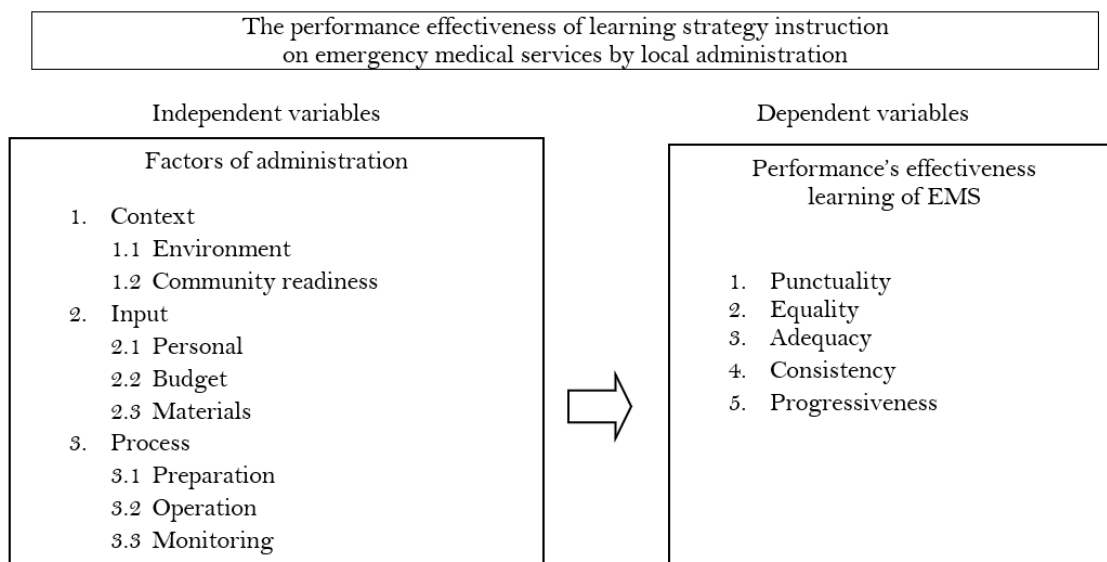


Figure 1. Conceptual framework.

| Independent variables | Dependent variables |
|--|---|
| 1.Context: consist of 1.1 Environment, referring to the areas for emergency medical service provision and access to service recipients, such as roads and incident locations, and 1.2 Community Preparedness, which involves cooperation in providing emergency medical services to service recipients, reporting incidents, and volunteer duties in assisting emergency medical services. 2.Import Factors consist of 2.1 Personnel, which refers to the staff or volunteer workers who provide initial patient care in the emergency medical unit and have received training in patient care. 2.2 Budget, which refers to the allocated funds for staff compensation, training of emergency medical unit personnel, as well as the procurement of vehicles for the emergency medical unit. 2.3 Materials, which include medical tools, equipment, and supplies used in patient care by the emergency medical unit 3.Processes consist of 3.1 Preparedness, which involves the readiness of operational staff, vehicle preparation, and communication for responding to service recipients. 3.2 Operations, which encompass incident notification, accessing service recipients, providing initial assistance, and transporting to medical facilities. 3.3 Monitoring, which entails monitoring the condition of service recipients after providing assistance and transferring them to medical facilities. | 1. Punctuality is a critical component of emergency medical service because it can significantly impact patient outcomes. Rapid response and care can make a difference in the severity of an injury or the progression of a medical condition. Reducing delays and providing prompt attention can save lives and improve the chances of a full recovery 2. Equity in emergency medical service emphasizes that healthcare providers should offer the same level of care to all patients, aiming to eliminate disparities and ensure that individuals in vulnerable or underserved populations receive the attention and treatment they require during emergencies. 3. Adequacy in emergency medical service means having the necessary resources and capabilities to provide timely and effective care during emergencies, with a focus on preparedness, availability of equipment and supplies, qualified personnel, and resource management. This ensures that patients receive the best possible care when faced with critical medical situations. 4. Consistency in emergency medical service is vital to guarantee that patients receive dependable and high-quality care during critical moments, which can make a significant difference in their outcomes and overall well-being 5. Progressiveness in this context means staying up-to-date and continuously evolving to meet the changing needs and challenges in the field of emergency medical services. |

3. Method

This research employs quantitative research methods, focusing on a population of individuals who have undergone Emergency Medical Services (EMS) in a local government area in the Northeast of Thailand. Data collection was conducted using a 68-item questionnaire with a five-point Likert scale. The Index of Item-Objective Congruence (IOC) was utilized, ensuring that items in the questionnaire had scores higher than 0.6, while the Coefficient Cronbach's Alpha was found to be 0.90. A sample of 636 cases was drawn from individuals who received EMS within sub-district health areas. The sample selection was purposeful, and the sample size determination was based on Lomax's theory. Trained researchers and their assistants explained the questionnaires to the participants, who were asked to complete the questionnaires themselves before returning them to the researchers and their team. Descriptive statistics, including percentages and standard deviations, were used to analyze general information, while Multiple Regression Analysis (Stepwise) was employed to predict the factors influencing EMS effectiveness performance within the community. The results of the data analysis were presented and explained using tables and figures. Following this, a qualitative study was conducted to address important issues. Data were collected through interviews with twelve individuals who had cooperated, worked, or received services at Sub-District Health Promoting Hospitals. Participants were selected using purposeful sampling. Semi-structured interviews were conducted to gain in-depth insights, drawing from the information obtained in the quantitative study. The data collected during these interviews were recorded, and subsequent content analysis and interpretation were carried out. Both qualitative and quantitative research findings were presented, and recommendations were provided.

4. Results

The data analysis showed that, overall, there was a positive correlation at a moderate level between the factors affecting the performance of Emergency Medical Services (EMS) and the performance effectiveness of EMS, with a statistical significance of 0.01 ($r=0.544$, $p\text{-value}<0.01$).

Table 1. Correlation between factors of administration and EMS performance effectiveness by LAOs.

| Factors of administration | EMS performance effectiveness | | |
|---------------------------|---------------------------------|-----------|-----------------------|
| | Pearson correlation coefficient | P - value | Levels of correlation |
| 1. Community | | | |
| 1) Environment | 0.585** | <0.01 | Moderate |
| 2) Community readiness | 0.623** | <0.01 | Moderate |
| 2. Input | | | |
| 1) Personnel | 0.576** | <0.01 | Moderate |
| 2) Budget | 0.426** | <0.01 | Low |
| 3) Material | 0.529** | <0.01 | Moderate |
| 3. Process | | | |
| 1) Preparation | 0.523** | <0.01 | Moderate |
| 2) Operation | 0.737** | <0.01 | High |
| 3) Monitoring | 0.358** | <0.01 | Low |
| Total | 0.544** | <0.01 | Moderate |

Note: **. Correlation is significant at the 0.01 level (2-tailed).

The EMS operation and the performance effectiveness of EMS shared a positive correlation at a high level, also at a statistical significance of 0.01 ($r=0.737$, $p\text{-value}<0.01$). The results for other factors were as follows: community

readiness ($r=0.623$, $p\text{-value}<0.01$), community environment ($r=0.585$, $p\text{-value}<0.01$), personnel ($r=0.576$, $p\text{-value}<0.01$), and materials ($r=0.529$, $p\text{-value}<0.01$). Service preparation and the performance effectiveness of EMS shared a positive correlation at a moderate level with a statistical significance of 0.01 ($r=0.523$, $p\text{-value}<0.01$). For budget ($r=0.426$, $p\text{-value}<0.01$) and monitoring ($r=0.358$, $p\text{-value}<0.01$), there was a positive correlation at a low level, Table 1 illustrates.

According to a multiple regression analysis of eight predictor variables affecting performance effectiveness of EMS by LAO in Northeast Thailand, only six variables – operation, community readiness, preparation, budget, personnel, and materials – could be used to forecast the variances of performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand at 60.8 percent ($R\text{ Square} = 0.608$). Variables of monitoring and community environment did not have any influence towards the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand as Table 2 and Figure 2 illustrates.

Table 2. Multiple regression analysis of predictor variables and the performance effectiveness of EMS by Local Administrative Organization.

| EMS effectiveness of LAOs | B | S.E. | Beta | t | Sig. |
|---------------------------|-------|-------|--------------------|-------|--------|
| Constant | 0.845 | 0.109 | 0.292 | 7.689 | 0 |
| 1. Environment | 0.012 | 0.029 | 0.015 | 0.417 | 0.676 |
| 2. Community readiness* | 0.157 | 0.026 | 0.205 ² | 5.832 | 0.000* |
| 3. Personnel * | 0.077 | 0.028 | 0.083 ⁵ | 2.751 | 0.006* |
| 4. Budget* | 0.048 | 0.014 | 0.088 ⁴ | 3.139 | 0.002* |
| 5. Material* | 0.060 | 0.023 | 0.078 ⁶ | 2.529 | 0.012* |
| 6. Service preparation* | 0.12 | 0.023 | 0.155 ³ | 5.173 | 0.000* |
| 7. Service operation* | 0.348 | 0.035 | 0.377 ¹ | 9.697 | 0.000* |
| 8. Monitoring | 0.014 | 0.015 | 0.027 | 0.949 | 0.343 |

$R^2 = 0.608, S.E = 0.285, f = 6.780^*$

Note: *at significance of 0.01*. Numbers indicate influential variables to the performance effectiveness of EMS. In descending order.
 1. Service operation.
 2. Community readiness.
 3. Service preparation.
 4. Budget.
 5. Personnel.
 6. Material.

The results obtained from the sample t-values implied that factors influencing the effective performance is positively and significantly influenced by variable 7 ($\beta=0.377$, $t=9.697$, $\text{Sig}<0.001$) by which independent Service Operation is influenced, also community readiness ($\beta=0.205$, $t=5.832$ $\text{Sig}<0.001$) by which independent variable 2 is influenced. V4 and V6 were influenced. Thus, the model findings show that influencing factors effective performance are significantly influenced by service operation, community readiness, service preparation, budget, personnel, and material. As Figure 2 illustrates.

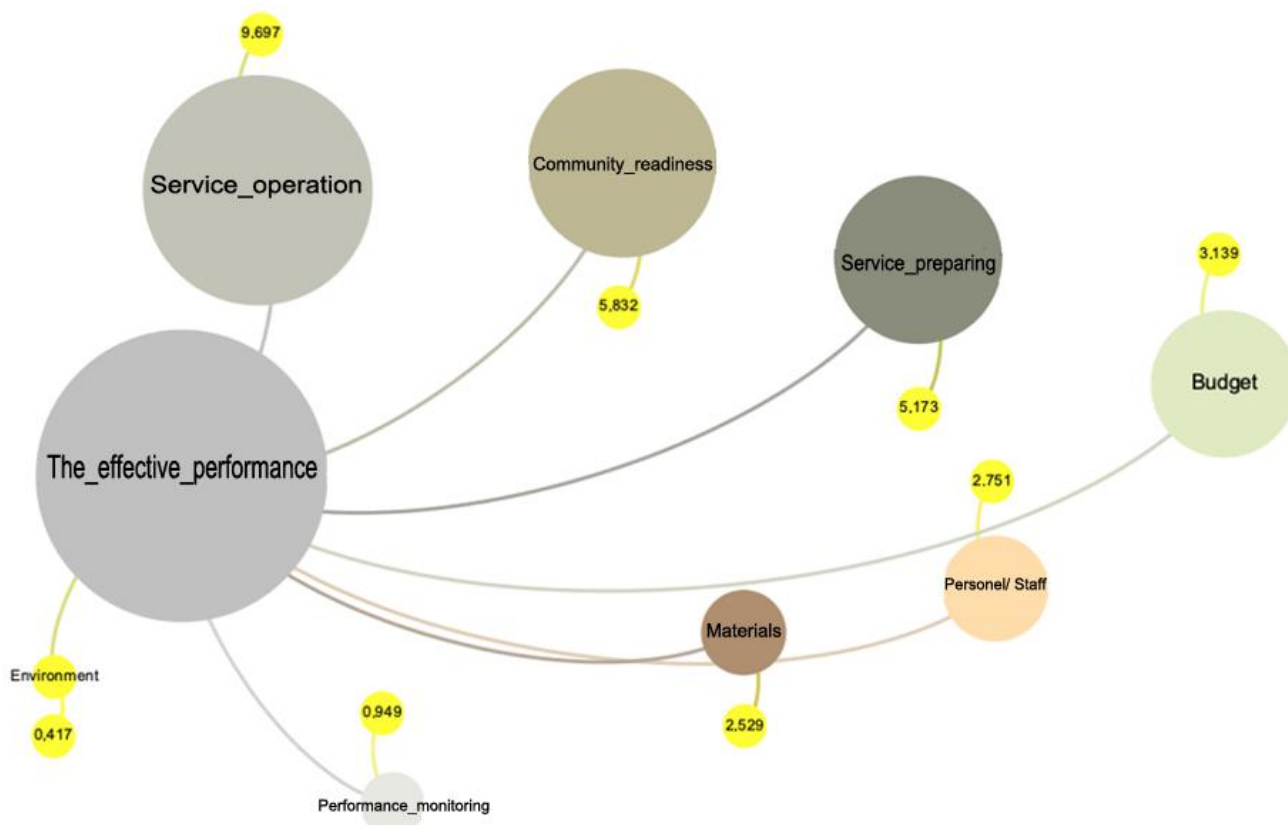


Figure 2. Model result of factors influencing performance effectiveness of EMS.

Note: For model testing, Gephi is employed because the model is highly complex and analysing complex models and relationships is properly done by Gephi (Everton, 2012; Freeman, 2004). Analysing the relationship of multi-item variables is possible by Gephi

From Table 1 and Table 2, the predictor factors affecting the performance effectiveness of EMS by LAOs can be shown in the forms of the forecasting equation of raw scores and standard score as following:

The forecasting equation of raw score

$$y' = 0.845 + (0.348) \textit{Service Operation} + (0.157) \textit{Community Readiness} \\ + (0.130) \textit{Service Preparation} + (0.077) \textit{Personnel} + (0.060) \textit{Material} \\ + (0.048) \textit{Budget}$$

The forecasting equation of standard score

$$z' = (0.377) \textit{Service Operation} + (0.205) \textit{Community Readiness} + (0.168) \textit{Service Preparation} \\ + (0.094) \textit{Budget} + (0.083) \textit{Personnel} + (0.080) \textit{Material}$$

For the forecasting equation of standard score above, it can be summarized as follows:

1. If the factor of operation increases by one unit, there will be an increase of 0.377 unit in the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. All other variables remain constant.
2. If the factor of community readiness increases by one unit, there will be an increase of 0.205 unit in the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. All other variables remain constant.
3. If the factor of EMS preparation increases by one unit, there will be an increase of 0.168 unit in the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. All other variables remain constant.
4. If the factor of EMS operation increases by one unit, there will be an increase of 0.094 unit in the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. All other variables remain constant.
5. If the factor of personnel increases by one unit, there will be an increase of 0.083 unit in the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. All other variables remain constant.
6. If the factor of EMS operation increases by one unit, there will be an increase of 0.080 unit in the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. All other variables remain constant.

5. Summary and Contributions

For any public service, the people who are in power or in charge of these services must focus on people's benefits. Emergency medical services should be easily reached by residents, who also must be involved in the EMS management. Service preparation, adequate budgets and human resource development are needed to implement the EMS effectively. Moreover, a development plan must be in line with the context of each area. Factors affecting the performance effectiveness of local administrative organizations might be different. Nonetheless, these organizations have common goals of focusing on people's interests and health so that they can get the maximum benefits from the service.

5.1. Factors Influencing Performance Effectiveness of Emergency Medical Services by Local Administrative Organization

The results show an operation has the most influence on the performance effectiveness of Emergency Medical Services by Local Administrative Organization. Five other factors – community readiness, preparation, budget, personnel, and materials are at moderate. The analysis also explains that all the factors have positive correlation at moderate level. That means to increase the performance effectiveness of the EMS, these factors must be continuously supported and developed. The findings are similar who claimed that the performance effectiveness of EMS depended on preparation and community readiness (Vattamparambil Nalan & Satheesan, 2020). Meanwhile, Kaplan and Norton said that to gain the most effectiveness and efficiency, the organization must be equipped with well-structured management process and qualified personnel able to perform in the circumstance with limited times and resources (Kaplan & Norton, 2006). Personnel supports, material maintenances and a good use of resources were essential to the effectiveness and stability of the organization (Nurmandi & Purnomo, 2011).

5.2. Factors Influencing Effectiveness of Learning Strategy Instruction on Emergency Medical Services by Local Administrative Organization

A multiple regression analysis of eight predictor variables affecting performance effectiveness of Emergency Medical Service by Local Administrative Organization, Udon Thani showed that only six variables could be used to forecast the variances of performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand at 60.8 percent (R Square = 0.608). They were operation, community readiness, preparation, budget, personnel, and materials. The other two variables - monitoring and community environment- did not have any influence towards the performance effectiveness of EMS by Local Administrative Organization in Northeast Thailand. Each factor or variable can be discussed as following:

5.2.1. Operation

To perform any emergency medical services, that must be done based on public services. Whenever, medical assistance is needed, the service operator must perform with his willingness and knowledge based on the principle of basic emergency medical services (National Institute of Emergency Medicine, 2015) because it is urgent pre-hospital treatment for serious illness. It is an illness which a person with knowledge of medical services believes needs urgent medical treatment. An ambulance is also available to deliver patients to hospitals (Krohmer, 2005). EMS operation, managed by Local Administrative Organizations, is free of charge. To deal with the case, they contact other involved

parties. Apart from transferring patients to hospitals, they also send them back home. With such services, operation is considered more influential than any other factors affecting the EMS performance effectiveness.

5.2.2. Community Readiness

For Emergency Medical Service system, community readiness plays part in the performance effective of EMS. Without support from residents in the community, the service cannot be provided. More effective performance can be expected with the organization development or changes. Also, the roles of society and community will be focused on innovation. The changes will benefit the emergency medical service (Bögel, Pereverza, Upham, & Kordas, 2019). For local administrative organizations of which work is to deal with communities, if people in the communities understand and give their full cooperation and preparation in receiving services, it is sure to promote and strengthen the performance effectiveness of EMS by local administrative organizations.

5.2.3. Preparation

The main responsibility of the Emergency Medical Services by Local Administrative Organization is management which needs to be handled by people equipped with knowledge and skills in rescue according to the principles of National Institute of Emergency Medicine (National Institute of Emergency Medicine, 2015). For the improvement of the management, all the facilities must be available and checked regularly (Paré, Guillemette, & Raymond, 2020). Monitoring and evaluation are also needed so that new ideas and recommendations will be used to improve the management and catch up with the changing situations (Mousa & Othman, 2020) and meet the standards recognized by the patients (Wang & Chow, 2012). In terms of process, the relationship between service preparation and performance effectiveness of EMS was positive at a high level. The continuous improvement of services' efficiency and quality and the different ways of planning have resulted in personnel' better performance and skills in meeting the demands of emergency services (Adler & Bryan, 1996; Daryani & Amini, 2016; Strokosch & Osborne, 2016).

5.2.4. Budgets

For all the organizations, the resources of personnel, materials and budgets all have an impact on the performance effectiveness. For the input factor of budget, disbursement should be easily managed to facilitate the working process. Whether the use of limited budgets in the organization becomes effective depends on the results and the employment of resources. Lu, Cai, Wei, Song, and Wu (2019) said that budget is important and many studies showed that budgets of each project can be influential to the performance effectiveness (Lu et al., 2019). In addition, the operators of the Emergency Medical Services budgets are essential for the EMS. That also includes wages for all the staff who should get paid for their services. The wages will also inspire them to continue working for the EMS (Saeheng et al., 2019).

5.2.5. Staffs

People who work for Emergency Medical Services (EMS) must be experienced and equipped with knowledge of rescue. There must be enough staff to take care of patients. In their study, has focused on personnel's skills, the number of personnel and other skills in the service jobs (Kampaengsirichai, Kunurat, & Erviana, 2020). People who have job-specific skills and knowledge, and a better understanding of their job can have an impact on the performance effectiveness in service jobs. EMS needs skilled people because their job is to save patients' life and prevent them from disability. It was in line with Kanchanasut (2012), showing that among five factors in the management of Emergency Medical Services by sub-district administration organizations were policy, personnel, materials, management and cooperation, and services and news, the organizations did not have enough personnel to support the services and these personnel were lack of some necessary skills at the scene.

5.2.6. Materials

All materials or tools must be available in ambulances or rescue service vehicles because each patient who suffers from an accident or an illness is different in terms of symptoms. The materials should be of quality and standard. They should be adequate for the EMS. Paré et al. (2020) said that the equipment including other facilities in each of the project can have some impact on the effectiveness of the organization and also help them to meet their target (Paré et al., 2020).

5.3. EMS Learning forward a Development Plan to Improve the Performance Effectiveness of the EMS by Local Administrative Organizations

According to the study of the factors influencing the performance effectiveness of the EMS by Local Administrative Organizations, a development plan can be set out as following:

5.3.1. Community

- Community Readiness Local Administrative Organizations should clearly and continuously inform people about the Emergency Medical Services and policies should also meet their needs.
- For policy and its implementation, and the project of EMS by local administrative organizations to meet the needs of people, the plan and budgets for EMS must be included in a three-year development plan so that it would have enough budget to run the project.

- For geographic reasons and the management of EMS by local administrative organizations, the geographic information system or computer program should be deployed in the rescue services so that it can help patients in time.

5.3.2. Management

- Chain of command, job assignments and regulations

The local administrative organizations have set organization structures, rules and regulations. However, rescuers or rescue teams are required to ask for permission from their bosses whenever they will help the patients. Consequently, the chain of command must be clear.

- Collaboration

For a collaboration with government agencies or other involved parties in the area, the EMS by local administrative organizations should make rescue service vehicles available. The database of these vehicles shared by its networks should be recorded.

- Human resource development

Personnel in the EMS by local administrative organizations should be given a chance to develop their skills and knowledge every year.

- Budgets

The system of wage or salary disbursement is not clear. It is urgent for both the National Institute of Emergency Medicine and the parties involved to solve the problem.

5.3.3. Decentralization

- The government should shift the power out to the local administrative organizations according to the constitution as soon as possible. If the EMS gets budgets, the shift of power will be complete, and the performance of EMS will be more effective and efficient.

5.3.4. Collaboration Network of Emergency Medical Services

- The network includes both government agencies and private sectors. Some of them have abundant resources but some do not. To gain the most effective performance for the EMS, the network should brainstorm to design the appropriate EMS. Provincial administrative organizations should be the leader in the EMS by local administrative organizations.

5.3.5. Law

- Local administrative organizations must study the law, policies and related regulations including the Emergency Medical Act 2009. They should check if there is any article problematic to their work. Also, they must submit it to the government for its correction.

5.3.6. Self-Management in Health

- Communities should be supported by local administrative organizations for the promotion of self-management in health. When residents have a better understanding of basic emergency medicine, they should be allowed to have their own management team in dealing with the emergency medical services. Local administrative organizations, regional hospitals, rescue foundations and private sectors are just the supporting team.

5.3.7. Infrastructure Development

- Local administrative organizations are recommended to have infrastructures or activities facilitating the effectiveness improvement of the emergency medical services system. That includes joining EMS Rally at all levels and taking part in EMS Rally workshop and the national emergency medicine seminar.

5.3.8. Innovation Learning

- Local administrative organizations should have the project of knowledge management (KM) and innovation. For example, the EMS team reaches out to the community, providing them with knowledge and understanding about the EMS and ask-for-help systems.

5.3.9. Standardization

- Standardization is not just about vehicles and materials. It also covers the likes of personnel, working experiences and training programs. If the policy-making people take a development plan to improve the performance effectiveness of the EMS by Local Administrative Organizations into account when setting out health policy, it would benefit all people.

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