Implementation of Supply Chain and Logistics for Natural Disaster Management in Indonesia : A Smart Governance Perspective

by Hendro Wardhono

Implementation of Supply Chain and Logistics for Natural Disaster Management in Indonesia: A Smart Governance Perspective

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Abstract: This research is at the ontological level and sociological level of the implementation of supply chain and logistics equipment for disaster management that are very significant in reducing risk of natural disaster in Indonesia. The problem is very interesting to be analyzed by conducting a descriptive qualitative research. The research used the theory of public policy, smart governance, and supply chain management and logistics. The data were collected using in-depth interview to several key informants, direct observation, and related documentation. The data were analyzed using interactive models, which were data reduction, data display, and data verification, supported by triangulation to obtain validity and reliability. The results were based on ontology, epistemology, and sociology using smart governance perspective by empowering supply chain and logistic to improve disaster management in Indonesia. Vision and mission of public policies related to natural disaster are needed to complete the facilities of prevention, equipment management and logistics supervision, providing information to stakeholders regarding regulations and sanctions in natural disaster that were carried out deliberately and balanced provision of disaster management. Therefore, it will produce a revised and detailed relevant regulation for state agencies as public officials in making regulations on natural disaster and disaster management in Indonesia. The researchers suggest that state institutions must conduct and cover smart governance in making regulations on disaster management.

Keywords: Public Policy, Smart Governance, Supply Chain, Disaster Management.

I. INTRODUCTION

Natural disasters often occur in Indonesia. The main reason is the ineffective implementation of supply chain and logistic for managing disaster. Multi-policies on natural disaster management were formulated by the legislative and executive state institutions and relevant agencies can also interpret multi-regulatory policies during their implementation.

This study aims to analyze the implementation of supply chain and logistics management of multi-regulatory public policies related to natural disaster management using the smart governance theoretical perspective of ontology, epistemology, and sociology.

A. Background

The National Disaster Management Agency (NDMA) contributed in distributing and supporting related materials such as general kitchens, water tanks, toilets, water purifiers light towers. The NDMA also distributed special equipment such as command rescue cars, trail bikes, generators, water treatment, boats, and communication equipment. The NDMA managed supply chain and logistics for disaster management and requires support from the community, business institutions, academicians and other related stakeholder with the aim of managing disaster in a fast way, effective, efficient and transparent manner.

Disaster management requires a multi-stakeholder collaboration towards a serious handling which should ideally be taken in an integrated manner. The disaster management was carried out through several key actors, that are the government, business, community, academia, and the media. Collaboration in managing disaster need knowledge, skills, and attitude, to handle a full treatment for disaster management.

Disaster is an unexpected situation that could cause damage, death to humans or objects or houses as well as all the furniture that we have and it does not rule out animals and plants to die. Disasters cause panic in the community and cause prolonged suffering and grief such as injuries, deaths, economic pressure, loss of

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family members and damage to infrastructure and the environment. Disaster management has been changed in multi perspective in line with history of changes of disaster management since 1960 to 2000. There was a change in perspective on disaster impacted reduction strategies from a narrowly technical discipline to a globally comprehensive movement (Carter 2008).

Supply chain and logistics for disaster management have yet to find the best solution due to some system factors that are deemed lacking and do not include strong control. This is deemed ineffective and inefficient when a disaster occurs. It takes proper and fast responsibility when dealing with disasters. Problems and programs designed to improve performance are carried out by strengthening supporting factors and reducing inhibiting factors in order to achieve maximum goals using the principle of smart governance for disaster logistic management reform (Thomas and Kopczak, 2005; Wassenhove 2006; Saleh, *et al.*, 2017; Assery, *et al.*, 2020).

Effectiveness and efficiency are goals in disaster logistics management that need to be implemented at this time in Indonesia for disaster management. Therefore, it is necessary to change and reform the bureaucracy in the management of disaster management equipment. Public and private stakeholders must have consensus-oriented decision making to resolve crucial factors at hand and still require the development of collaborative forums. Increased cooperation is a new era in government but implementation in the field has not been done much. Integration is necessary and could be applied to manage the level of complexity in dynamic interactions. This must be carried out together and designed to achieve better goals in disaster management (Ansell and Gash, 2008; Leong, *et al.*, 2011; Emerson, *et al.*, 2012; Brugger, *et al.*, 2018).

The need for information through internet networks has increased significantly because large data can provide benefits and more accurate decision making. Big data and supply chain management are literacy references combined in conceptual approach namely supply chain analytics. There are several factors, such as function, process, collaboration, and sustainability, to analyze supply chain implementation and logistics. The use of big data analysis as a strategic asset must be integrated into all activities so that it can be properly integrated (Dubey, *et al.*, 2017).

Implementation in the field is related to uncertainties and limitations in dealing with stakeholders. Supply

chain and logistics requires public policies to achieve goals and is expected to make a positive contribution. Actions and thoughts related to the public interest are motivated by public policies related to power (Fernández-Giménez *et al.*, 2019; Kapucu, *et al.*, 2009; Ikeanyibe, *et al.*, 2017; Riyadi, *et al.*, 2020; Riyadi, 2020; Riyadi, 2020, pp. 274-284; Riyadi, *et al.*, 2020, pp. 1292-1300).

Based on the previous research and disaster phenomena in Indonesia, deep explore are still needed. At the ontological level, there is no statutory level of regulation as a legal umbrella in managing supply chain and logistics for disaster management. At the novel level, it is necessary to have a model for implementing the smart governance of the supply chain and logistics for disaster management. Therefore, this issue is very interesting to be studied.

B. Research Objectives

This research is useful for academicians and practitioner by adding knowledge related to public policy concepts and collaborative governance in terms of natural disaster management. And for the legislative and executive as the public officials should make a revised and detailed regulations on natural disaster management.

C. Original Research

Fauzi and Nordiawan (2015) examined logistics management for natural disasters and compared several models of good governance to construct a better system. The research results formulate several possibilities that can optimize logistics management for natural disasters. It is necessary to develop and measure common perceptions about logistics management for natural disasters. It is necessary to improve the competence and knowledge of logistics staff and the effectiveness of monitoring activities following the appropriate standards of competency requirements for disaster logistics management. It is necessary to form a supervisory team for guidance and knowledge transfer so that disaster logistics management is carried out in accordance with the provisions and competencies.

Sokat *et al.* (2016) examined a dynamic logistics team after a disaster occurred and the challenges faced during the disaster management process from humanitarian logistics. With a specially developed comprehensive simulation research method,

researchers can identify emerging data and for more efficient humanitarian logistics purposes then integrate this data into a decision-making process. The research results explain that humanitarian logistics are validated in a logistic model developed based on the time shared by humanitarian agencies by undergoing an iterative process, then discussing it with logistics experts to help with their operational activities

Fallucchi *et al.* (2016) investigate the implementation of a Knowledge Management System that can be used as a basis for new knowledge and provides data analysis. Disaster management uses a Knowledge Management System for an effective and fast response in the event of a disaster. Disaster management requires intervention and coordination between organizations and resources. By accessing real time information and knowledge for knowledge-based decision making, it correlates heterogeneous data sources to reduce complexity and support supply chain responses and humanitarian logistics to natural or man-made disasters.

The differences of above previous research on natural disaster and disaster management regulation is that the government and its agencies should manage natural disaster and environmental problems by enforcing of rules and standards to be setup out in laws and treaties. This study analyzed a multi policies approach regarding natural disaster management in Indonesia.

II. RESEARCH METHODS

A qualitative research strategy can be applied if there are research problems that still need to be explored more deeply or followed up on previous quantitative research due to a previous theory or concept is still considered unable to capture the complexity of the problem under study. A qualitative research approach produces descriptive data in the form of words or writings and behaviors that can be observed from the subject and object of the study itself. The qualitative approach was chosen because it is in accordance with the aims of the research to describe and understand the phenomena, events, social activities, attitudes, beliefs, perceptions of people (Creswell, 2013).

The data collection in this research were interviews, observation and documentation. It was used in-depth interview to 10 informants as key member in The National Disaster Management Agency. Participant observation was conducted by author and team to obtain records in the field of study. Related documentation was gathered from many sources such as internet media and library documents.

The data analysis in this research used three steps, which were data reduction, data display and data verification referring to interactive model. Data reduction is to out the main data, data display is to present the data, and data verification to conclude the main themes of the results (Miles and Huberman, 1994).

The validity in this study used triangulation based on the observation, in-depth interviews, and documentation analysis to obtain valid and reliable data coping credibility, transferability, auditability, and confirmability. Credibility related to the truth aspect by means of triangulation to compare the results of an interview with the results of interviews with colleagues. Transferability shows the applicability of research to other studies that readers can understand the results of qualitative research. The report is made in a detailed, clear, and systematic manner. Auditability means that it can be tested by examining the entire research process, since researchers design case studies, determine data sources, collect data, conduct data analysis, to make conclusions, must be able to show the stages, processes and results. Confirmability related with the objectivity that the research results are agreed and accepted (Creswell, 2009).

III. LITERATURE REVIEW

A. Review of Public Policy Theory

Paradigm shift in Public Administration is through each point of view. Important paradigm changes can be seen from Frederickson (1976), Henry (1986), and Hood (1991). A new paradigm change does not mean that the previous paradigm is completely erased. The paradigm that has passed is still valid in accordance with the point of view, values or methods used by a certain group of scientific communities and also depends on the problems or scientific problems at hand.

Frederickson (1976) divides the development of the public administration paradigm emphasizing the focus, locus, and value to be achieved. The first is the classical bureaucracy, with a focus on organizational structure and management functions, the locus is the government bureaucracy and business organization,

and the values to be achieved are efficiency, effectiveness, economical and rational. The second is neo-bureaucracy with a focus on behavior-based decision-making processes, management, systems, and research, with the locus of government bureaucratic decisions, and the values to be achieved are efficiency, effectiveness, economics and rationality. The third is institutions with a focus on understanding bureaucratic behavior and making decisions that are gradual and incremental in nature. The fourth is human relations with a social-psychological focus and the locus is organization and the values to be achieved are participation in decision making, minimization of differences, status, openness, self-actualization, and increased job satisfaction. The fifth is public choice with a focus on providing services to the community. The sixth is New Public Management (NPM) concerning human values and social justice, with a focus on organizational design based on decentralization, democracy, responsiveness, participation, and providing services needed by the community.

Henry (1986) divides the paradigm based on time periodization. The first (1900-1929) is the separation between politics and public administration, with a focus on civil service and government budgeting, with political and policy loci. Second (1927-1937) are administrative principles focusing on administrative principles, namely planning, organizing, coordinating, reporting and budgeting with a locus in any organization. Third (1950-1970) is political science because its focus is in the formulation of public policies which are full of political values and the locus is bureaucracy. Fourth (1956-1970) considers public administration as a part of administrative science that must be developed scientifically with a focus on public administration and business administration. Fifth (1970-1990) states that public administration as public administration with a focus on organizational theory, management theory and public policy, while the locus is public problems and public interests. Furthermore, a new paradigm emerged (1990-present) that public policy as governance with a multi-dimensional approach, focusing on public affairs that require private parties and society, with the locus of the public, private and civil society sectors.

Previous paradigms still show the dominance of the government and it is necessary to re-examine the role of the government. The role of the community in government administration and public services has become increasingly prominent. Community involvement in the delivery of public services is a

necessity. A new model is needed to improve the performance of public services with results-oriented and competitive dynamics by changing the rules of the game and fostering creativity in providing services. The emergence of the New Public Management (NPM) paradigm in the early 1990s was first introduced by Hood (1991) as an important momentum questioning the dominance of the government and providing space for the private sector to participate in public services.

The main characteristic of NPMs is the change in the bureaucratic environment based on standardized and hierarchical rules toward a flexible public management system that is more oriented towards the public interest. There are 7 NPM doctrines, namely the use of professional management, the use of standards and performance measures, a greater emphasis on control of output, smaller units, tighter competition, application of private management models to public sector practice, and discipline and resource saving (Hood, 1991).

The development of public policy has experienced a paradigm shift in government. This development studies the behavior of stakeholders and networks that collaborate in policy making. Public policy focuses on collaboration to solve problems and goals. Collaboration has a broad scope and focuses on the substance and process of solving problems effectively. Non-hierarchical mechanisms and participation will contribute better to collaborative public management with practices in the future. Public policy is related to the extent of authority and responsibility of government and stakeholders. Distribution of power in relation to laws and policies. The aspirations of stakeholders and the restructuring of the country's political and economic role need to be considered. Ineffective public services will lead to social, political and economic causes (Kapucu, *et al.*, 2009; Ikeanyibe, *et al.*, 2017).

Based on the epistemological and sociological description of public policy theory for refining the research, it can be stated that the making of multi-policies on natural disaster management occurs in Indonesia is a part of public policy theory.

B. Review of Smart Governance Theory

Human and device provide a variety of services that seek to make it easier, more convenient and more efficient. Direct income from consumers can ensure the sustainable development of smart industries. Threats come from smart industry and smart governance that

can abuse the trust of the people it serves. The roles of the three smart governments: first, avoiding the intelligence gap between the public and private sectors; second, improve the smart industry, third enforce privacy protection (Cellary, 2013).

Smart Governance has not fulfilled its promise to create an effective and democratic system. An understanding of social problems and insight into how to interpret technology can lead to how to use it. The use of technology with certain characteristics may not be sufficient to build an effective or smart government system and needs to go hand in hand with an understanding of the social problems and issues being addressed. The model is built on the idea of gaining social understanding by studying the activities of the stakeholders involved. The amalgamation of social aspects or entities, relationships, rules, and information flows forms a system that at the implementation level involves the community to understand social dynamics (Shukla, 2017).

Smart governance is a key aspect that continues to grow but understanding is limited. It is necessary to explore the concept of Smart governance theoretically and empirically by developing a research model of Smart governance. The expected outcomes and identified implementation strategies form the basis of smart governance. The main dimensions are presented to a sample of government representatives to investigate practitioners' perceptions and refine studies. Models for research on implementation strategies, smart governance arrangements, and outcomes from smart governance are essential to follow up (Bolívar and Meijer, 2016).

Communities and governments around the world have faced challenges that transcend capacities and capabilities. Previously, the government reached out to the community using traditional approaches as well as classical processes. The challenges consist of the economic transition, the industrial revolution, government spending, the pace of market changes. However, there has been a delay in intervention and weak lawmaking and a delay in government action. It seems that democratic self-government needs to develop new institutions and new mechanisms to keep up with the dynamics of the global society. Information is ubiquitous and technology is a substantial backbone for developing smart governance, and that is open, agile, and collaboration among stakeholders at all levels (Scholl and Scholl, 2014).

The smart governance is the principle, factor, and capacity of the government in overcoming the conditions and urgency of public knowledge. The smart governance is redesigning formal governance while maintaining the principles of democracy that are historically developed and a free market economy. Smart governance must address complexity, uncertainty and competence. The development of smart governance is focused on several key factors such as problems, implementation, contribution, involvement, coordination and information dissemination. Hence, realizing Smart Governance means bureaucratic reform Scholl and Scholl, 2014).

Based on the epistemological and sociological description of several definitions of smart governance theory, it can be stated that the making of multi-policies of natural disaster management that occurred in Indonesia can be analyzed by the concept of smart governance.

C. Review of Supply Chain Management Theory

Supply chain is a chain that involves many stakeholders. Supply chain is a collaboration in which there is a flow of information. Supply chain requires a physical efficiency strategy and a responsive strategy. Supply chain was first popularized by Oliver and Weber in the 1980s. Supply chain namely a network of cooperation between stakeholders in which there is a flow of information and resources. The outputs of a supply chain are products and services supported by a physical efficiency strategy and a responsive strategy. Supply chain management deals with decisions about location, supply, inventory, production systems, and transportation. Supply chain is a chain that involves many parties (Chopra and P. Meindl, 2007).

Supply chain management is a fairly complex job involving managers who need to understand supply chain risks such as delay risk, disruption risk and capacity risk. Supply Chain has several important characteristics, namely integration, participation, information exchange, cooperation, and the long term (Chopra and Sodhi, 2004; Giunipero, *et al.*, 2008).

There are 6 important elements of a supply chain, namely trust, commitment, dependability, and compatibility. Trust is mutual understanding in character, motive, and competence. Commitment is the willingness to maintain existing cooperation. Dependency is one party's need for another to achieve goals. Compatibility is alignment in achieving goals.

Supply chain orientation is an integrated perspective among stakeholders in a bond to jointly serve the needs of the community which consists of orientation to customers, suppliers, competitors, logistics, operations and value chain coordination (Mentzer, *et al.*, 2001; Hutt, *et al.*, 2000).

Customer orientation in the context of supply chain must be understood by all companies. If it is only implemented by one company, the customer orientation will become narrow, the customer role becomes passive, the customer becomes unresponsive, and the information technology infrastructure is separated so that performance becomes static. Customer orientation with a supply chain point of view means that the scope is wider, the role of the customer is more active, the customer is more responsive, and the information technology infrastructure is integrated so that performance becomes dynamic (Hult, 2008; Jeong and Hong, 2007).

Based on the epistemological and sociological description of supply chain management and logistics theory, it can be stated that the making of multi-policies of natural disaster management that occurs in Indonesia can be analyzed by the concept of supply chain management and logistics.

IV. DISCUSSION AND ANALYSIS

Based on data collection and data analysis, it can be resulted as follows.

There is resistance to the administration and governance of disaster management equipment. Smart governance has been implemented in the reform of equipment governance by launching the e-logpal system. The concrete form of implementing Smart Government in equipment management appears at the center of government. The national Disaster Management Agency launched the sismanpal application in 2018 as a form of electronic government. As for the region, it's called e-logpal. Through it, logistics and equipment records are automatically carried out through the e-logpal system.

How much is the desire to reform disaster management equipment, especially in adopting smart governance? Each district or city has been given an account so that it can monitor equipment and logistics data. The public can also access a summary of the equipment they have through the system. In implementing Smart Governance, the regional head

provides enormous support because it is considered an innovation that makes it easier for the community.

How significant is the application of smart governance before and after it is implemented in equipment governance? The e-logpal application is not yet optimal and still needs a lot of improvement because it has been running for 2 years and was launched almost simultaneously with the sismanpal application.

Is there administrative resistance in efforts to reform the bureaucracy? There are no bureaucratic obstacles because of its relation to form smart governance and the government supporting and concern. The e-logpal application still needs to be updated manually. This data update requires confirmation from each region and cannot be updated automatically. The national sismanpal application is actually still in the process of being improved, but on a platform basis, it has already been rolled out to the region. Besides, there is no complete technical guide. The understanding of the tools also varies between regions, such as the irregular naming in the nomenclature. This happens because there is no common perception between the central and regional governments, even though there is already a legal basis, but it is related to the type of equipment that must be owned and the amount.

What have been the demands of the community in disaster management? Actually, the region is the party that accompanies the national, but it is considered as the actor who is directly involved. Regions also have tools but they are considered for backup only, meaning that the community's expectations are high for the region. There is a division of roles for disaster affairs down to the district as executor and coordinator.

What is the urgent need for a transformation in the management of disaster management equipment? To make a change into an integrated system, clear regulations or rules are needed, namely clearer technical instructions so that all regions have a uniform understanding and human resources in related fields must also be improved.

What are the main factors that encourage smart governance to be initiated? In terms of work culture, not only equipment but all lines use smart governance. This means that the work culture here has built smart governance. From a social perspective, nowadays everyone has a means of communication such as an android cellphone, meaning that they can access the

application system. This is really support the implementation of smart governance. From the public side, they already understand online or offline and participate in using electronic devices properly. The government has a high desire to initiate smart governance with support and concern.

What are the main challenges in initiating Smart Governance? Regional do not have supportive human resources and regulations are unclear, it is necessary to change the mindset to encourage change. It takes triggers to lure them in for change to occur. The government as an actor in implementing smart governance has not considered this important.

What are the main risks in smart governance initiatives? They are the risks of increasing the budget for system creation and maintenance in implementing smart governance.

What major changes are needed to implement smart governance? From a non-binding policy perspective, it requires a willingness to emerge. Policy is the spearhead. We need to force employees through regulations by raising awareness of the importance of smart governance because current regulations are less binding and less specific.

What are the benchmarks for the performance of implementing smart governance? The answer is tn terms of equipment and data update that can be done periodically, quickly, and precisely to find out the conditions and situation in each region and disaster location quickly and precisely. When it comes to logistics and equipment, it requires responsive action in a very short time to achieve a successful disaster management performance.

What kind of approach is used in implementing smart governance? For the region there are 3 models, i.e., the tsunami disaster, volcanic disaster, and poisonous gas disaster which are still on progress in the formulation of the model. It needs to be tested in advance with the actors involved which will be carried out soon. Therefore, it is necessary to create a situation that requires collaboration between stakeholders.

Supply chain and logistics of disaster management includes 3 stages, namely pre-disaster, during disaster, and post-disaster. The normative dimension becomes the reference for equipment governance refers to Law Number 24 year 2007 and Government Decree Number 21 year 2008 and the details into many Chief

Decrees. The implementation of equipment governance has constraints that affect the ineffectiveness and efficiency of disaster management. The amount of loss and equipment damage incurred during the disaster is still very limited in accessibility to the disaster areas. Limited and inadequate equipment, and poor logistics and equipment data collection have resulted in ineffective disaster management.

The supply chain and logistics for disaster management in the smart governance perspective of The National and Regional Disaster Management Agency in Indonesia have existed. However, there are some problems regarding the integration among stakeholders that were not involved. A disaster management system combining of multi aspects should be deployed to cope with the situation that leads to minimizing costs and achieving best results.

V. CONCLUSION

Based on the analysis of the research results above, it can be concluded that the legislative and executive as public officials make multi-policies regarding natural disaster management. State institutions involved implied that the natural disaster management in Indonesia was ineffective and inefficient.

The researchers suggested that related state institutions as the public officials in making regulations on disaster management in Indonesia should conduct a better regulation covering the holistic governance of disaster management.

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