



Roles of Pati Regency, Central Java, Indonesia on controlling pesticide trade

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Abstract. The application of pesticides across Pati Regency is estimated to reach one million liters annually. Therefore, the region has become the major market for pesticides. The pesticide supply across the regency is a result of a long distribution chain from storage, sale, and transportation. Role and function of local government on controlling the pesticide distribution in Pati Regency is necessary to create an integrated environmental and public health management towards sustainable agricultural development. This qualitative study applied a policy implementation approach as proposed by Grindle (1980) who contends that implementation is a general process of administrative action that can be studied at particular level. The role of the Government of Pati Regency in the pesticide distribution had not been capable to place the pesticide control system into practice due to the following factors: weak law enforcement, poor governmental institution performance, aggressive pesticide marketing, attitude and knowledge about the pesticides, and inadequate information of the farmers about the use of the pesticides. Stronger capacity of institution, law enforcer, education and training, and registration of pesticide distribution is necessary towards the environmental-based pesticide distribution and sustainable agriculture and development.

Key Words: agricultural kiosks, policy implementation, law enforcement, sustainable agriculture, paddy farming.

Introduction. Human food fulfillment has motivated the development of new agricultural technologies. Such change aims at delivering better agricultural products, such as those with strong immunity to germs and pests. From this idea the agricultural sector is introduced to pesticides.

Pesticides distribution in Pati Regency, Central Java Province, Republic of Indonesia, begins with wholesalers or main distributors to retailing kiosks. The retailers order the products through two different channels, i.e. direct purchase to the distributors and take order marketing to agricultural production shops. Of these two channels, most of the retailers prefer buying the products directly from the distributors because they can respond quickly to the need of farmers for the pesticides. The farmers have a freedom to purchase as many pesticides as they need.

The application of pesticides across Pati Regency is estimated to reach one million liters annually. Therefore, the region has become the major market for pesticides. The pesticide supply across the regency is a result of a long distribution chain from storage, sale, and transportation.

Role and function of local government on controlling the pesticide distribution in Pati Regency is necessary to create an integrated environmental and public health management towards sustainable agricultural development. The sustainability will guarantee main agricultural products, in particular paddy from the rice field. A study performed by Pham et al (2013) reveals a failure of Vietnam government to regulate the pesticide market due to four factors, i.e. poor governance, weak legal stance, corruption, and distorted information. A similar condition may occur in Indonesia.

Jacquet et al (2011) and Skevas et al (2013), who studied tax scheme and economic incentive in Thailand, explored a 10% growth of pesticide application with high

external cost. Rujian & Youngl (2013) found a correlation between farmer's knowledge to pesticide application and policy implication. Al Zadjali et al (2013), exploring extension of farmers awareness of pesticide control in Oman, found that the national government restricts the use of pesticides with active substances by the farmers who were not the members of associations. Chu et al (2012) in their research on evaluation and use of pesticide registration and management found that pesticide composition must be regulated in export-import activities.

Researches done by Skevas (2012), Chu et al (2012) and Pham et al (2013) on pesticide market and control were absent of life-cycle assessment (LCA) based pesticide cycle. Margni (2002) and Rasanen et al (2015) explored effects of pesticide application on health and ecosystem. Juraske & Sanjuan (2011) had an observation on the effect of pesticide application on fruit and vegetables, whereas, Birkved (2012) compared effects of pesticide application. The LCA studies, otherwise, have been performed by Birkved & Hauschild (2006).

Interviews with members of Surveillance Commission for Fertilizer and Pesticide of Pati Regency, the Regency Office of Agriculture, revealed that the pesticide application in Pati Regency had been as many as 100,000 liters in a year-round. The high demand on pesticides had opened opportunities to provide more pesticides to the local farmers.

The current conditions proved that the pesticides were freely trade, in which sellers and buyers, i.e. the farmers as the end users, had a full freedom to purchase them. No reports or records were available to control the trade. Therefore, a life cycle assessment must be implemented in order to offer an appropriate model of the pesticide trade and distribution towards sustainable agriculture.

Material and Method. This qualitative study applied a policy implementation approach as proposed by Grindle (1980) who contends that implementation is a general process of administrative action that can be studied at particular level. The implementation process begins as purpose and target have been determined. Field observations were performed in seven villages across Pati, i.e. Srikaton, Sukorukun, Sriwedari, Ngurensiti, Bumiayu, Dukuhseti, and Kembang.

Results and Discussion. Pati Regency is among 35 regencies/municipalities under administrative are of Central Java Province, Indonesia. It has a strategic position because it is situated on national highway channeling important cities in Java Island, including Semarang, Jakarta, and Surabaya. Its geographic positions were $110^{\circ}15' - 111^{\circ}15'$ East and $6^{\circ}25' - 7^{\circ}00'$ South. The regency covers 150,368 ha² area comprising 58,448 ha rice fields and 91,036 ha area for other functions.

Human Development Index (HDI) rate of the regency for the past five years proves a good progress from 65.71 in 2011 to 68.51 in 2015. Whereas, its Gross Domestic Product has continued to grow as the income per capita increases.

Respondents for the research consisted of those executing the pesticide distribution, i.e. drivers and transporters, who delivered the commodities (aged 26 and 34 years old) and pesticide sellers.

The distribution of pesticides in Pati Regency has been equally done across the region from urban to rural areas where agricultural activities are taking place. The pesticides were obtained easily by the farmers who directly buy them from the agricultural product shops.

Statistical calculation on the volume of agricultural product shops and kiosks by the Pati Regency Office of Agriculture had been performed. However, there were still many unregistered sellers and kiosks remaining without any business licenses. The research found 14 kiosks with license and 10 kiosks without license of any legal notice from the Regency Government (Table 1).

Table 1
Composition of registered and unregistered pesticide kiosks by village

Village	Kiosk	Registered	Unregistered
Kembang	5	3	2
Luwang	3	2	1
Bumiayu	4	2	2
Dengkek	3	2	1
Cengkalsewu	4	2	2
Sriwedari	5	3	2
Total	24	14	10

The sellers marketed the pesticides freely; the pesticide users demonstrated irresponsible and unsafe behaviors towards application. Most of the respondents (60%) claimed that the pesticides did no harm to their health. They rarely washed their hands and wore recommended safety suits during contact with pesticides.

The field observation found that pesticides distribution in Pati Regency was provided by 102 different brands. The pesticides in the market were those of organophosphate, carbamate, and pyretroid. The observation also found 12 pesticide producers operating at either local or national markets. Too many products and distributors had led the pesticide providers to practice a simple marketing channel. Syahyunan (2014) explains that simple marketing uses only one or two mediating agencies, i.e. the producers directly contact the retailers to market the products or the producers co-operate with the distributors to offer the products to the retailers.

The existing pesticide trade scheme in Pati Regency can be illustrated as it is shown in Figure 1.

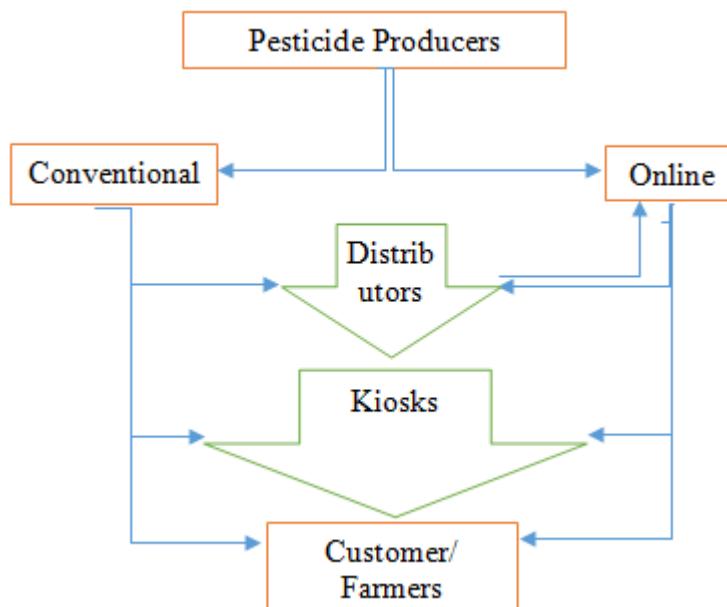


Figure 1. Existing pesticide trade in Pati Regency (2016).

Figure 1 explains a free trade of pesticide in which all distribution channels are exploited. The producers are aggressively marketing the products to the closest points of the users, even directly to the farmers with pilot model.

The data on pesticides had not been presented at any level. In other words, there were not available at the levels of agricultural extension staff, agricultural affair offices, and surveillance commission for fertilizer and pesticide in Pati Regency. According to Law 12/1992 pesticides to be distributed across the territory of the Republic of Indonesia must be registered, fulfill quality standards, hold effectiveness warranty, to be harmless

for human and environment, and to be labeled. The commission has not executed any of its duties in the regency.

The policy on pesticide in Indonesia is quite similar to that of other Asian countries. In 1960s pesticides began to be introduced to fulfill the demand on the agricultural development. By 1973 the government of Indonesia had issued Decree No. 7/1973 on surveillance of the pesticide provision, distribution and application.

Furthermore, Decree of Minister of Agriculture No. 45/Permentan/SR. 140/10/2009, amended by Regulation No. 24/Permentan/SR.140/2011, requires pesticide licensing and application purpose. The main objective of the policy is towards effectiveness, safety, and sustainability.

The pesticide surveillance has become one of key aspects to the pesticide management. Therefore, the government continued to strengthen its grip on the pesticide management by issuing Decree of Minister of Agriculture No. 42/Permentan/SR.104/5/2007 on the pesticide surveillance. At regency/municipal level, the surveillance of the pesticide management begins with the pesticides entering the administrative territory through the practical application by the end users to control pests as well as its impacts on the environment.

The pesticide surveillance activities in the agricultural realm, including paddy, closely relates to the pest management to ensure the regulatory control on import, distribution, application, and disposal of the pesticides in order to minimize the risks upon human health and environment, as well as to create a good living condition of the environment and the public health at large.

The pesticide trade, transport, application, and pesticide-related waste management are activities that can bear on risks for the environment and health. For example, all respondents reported that wastes produced by the pesticide trade at the agricultural kiosks were burnt nearby the houses (plastics) or resold (papers/cartoons). The expiry pesticides were still used by mixing it with other pesticides. Four respondents (4%) found illegal pesticide products in a container packaging. These products did not have any license and were distributed circularly by the producers.

The field observation found some pesticides already prohibited for use. The Regulation of Minister of Agriculture No. 39/Permentan/SR.330/7/2015 prohibits the following products: chlropyrifos, 2-4D, fentoat, and diazonin, to be distributed and used in pest control. Further interviews with the sellers revealed that there were still many pesticides distributed without label. These active substances were formulated from three different types of insecticides, including the prohibited organochlorine.

The above facts had proven that the pesticide distribution and control across Pati Regency were similar to that of Vietnam (Pham et al 2013), in which the local government had not been capable of controlling the pesticides. Another case was found by Al Zadjali et al (2013) in Oman where the farmers still applied active substances already prohibited, and Praneetvatakul et al (2013) who reported the growth of pesticide application in Thailand to be 10% higher than before. Pham et al (2013) added that the failure of the Vietnam government to control the pesticides was due to poor governance, law enforcement, corruption, and misinformation. Falconer & Hodge (2000) and Zhou et al (2014) revealed that tax scheme had a low impact on the pesticide control.

According to Government Decree No. 07/1973, Decree of Minister of Agriculture No. 45/Permentan/SR.140/10/2009, Decree of Minister of Agriculture No. 24/Permentan/SR.140/4/2011, and Decree of Minister of Agriculture No. 39/Permentan/SR.330/7/2005, the study concluded that the government had not been capable of controlling the pesticide distribution. The research analysis obtained the following data:

- a. Pesticide brand and type information were not available;
- b. Almost a half (44%) of the total pesticides sold did not have license;
- c. The producers kept distributing the prohibited pesticides (2-4D, fentoat, chlropyrifos, and diazinon), illegal pesticides were distributed undercover;
- d. Unregistered pesticide distribution and application;
- e. Competency system for pesticide managers was not available;
- f. Law enforcement on the pesticide distribution was weak;

- g. Surveillance Commission for Fertilizer and Pesticide was not available at retailer level;
 - h. Extension and information were inadequate, and misinformed farmers who believed that pesticides were the cure and the lifesaver of paddy harvest.

These current states became the valuable inputs for this study to offer the following model (Figure 2) of pesticide trade and distribution towards the sustainable agriculture and environment:

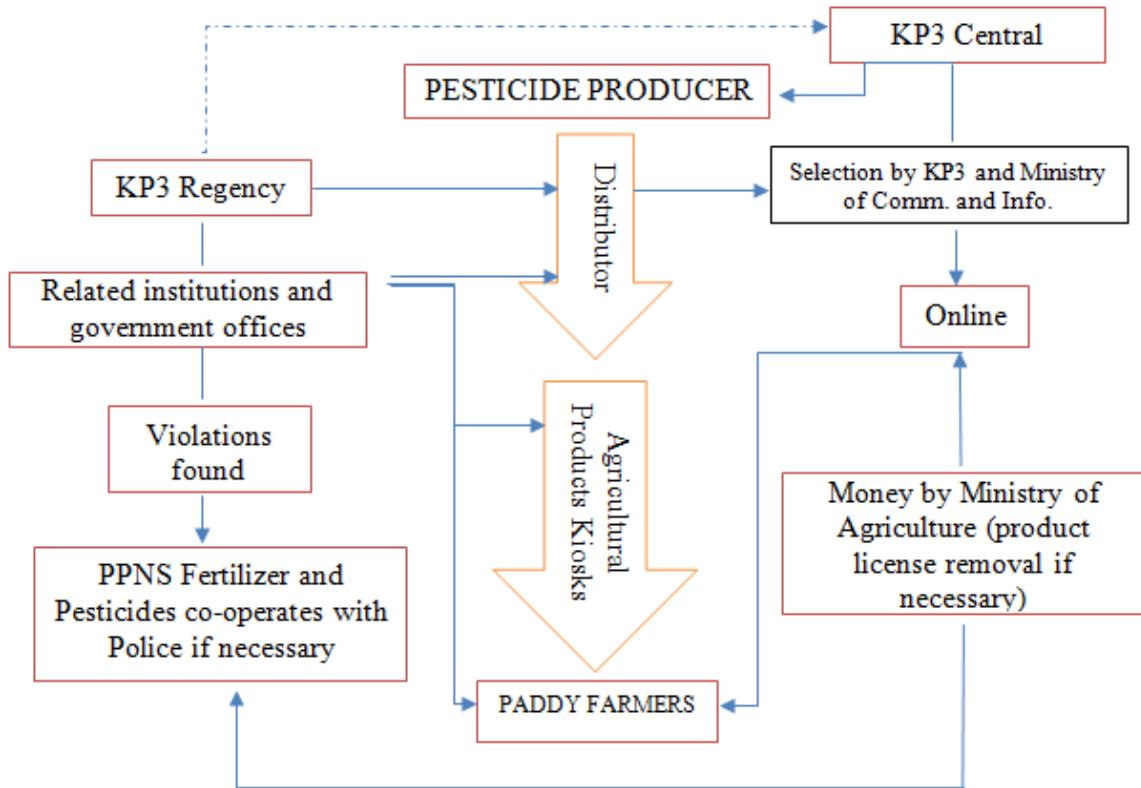


Figure 2. Recommended model for pesticide distribution.

Figure 2 shows a recommendation for the pesticide distribution. It uses the pesticide distribution channel from the producers to the distributors. The kiosks purchased from the distributors, whereas the farmers can only purchase the products from the kiosks. The advance of technology may be useful to market the pesticides, such as on-line services. The product delivery can only be controlled by the central office. In this case, the Ministry of Communication and Information has the authority to take part into the pesticide distribution control under the Decree of Ministry of Agriculture No. 39/2015.

Law enforcement is necessary to enhance the programs towards the sustainable development. Any violation, either on conventional or on-line bases, must be reported to PPNS for investigation. Co-operation is necessary with Police Department to finalize the law enforcement process.

Conclusions. Regarding the distribution of pesticides, the Pati Regency government was not able to fulfill its role in implementing a viable pesticide control system due to the following factors: weak law enforcement, poor governmental institution performance, aggressive pesticide marketing, attitude and knowledge about the pesticides, and inadequate information of the farmers about the use of the pesticides.

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