




## FACTORS AFFECTING THE MANAGEMENT OF PESTICIDE BUSINESS: THE CASE VIETNAM

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### ABSTRACT

Based on the context of Thanh Hoa province, Vietnam, this paper studies the factor affecting the management of pesticide business for the case of Vietnam. The authors propose the model with five factors affecting the management of pesticide business activities in Thanh Hoa province, including (i) Content and implementation methods of the legal documents; (ii) Capacity of the management staff; (iii). Awareness and legal compliance of the pesticide traders; (iv) Budget, infrastructure, and facilities for the pesticide management; and (v) Collaboration between management stakeholders. In this study, 176 pesticide traders were investigated for the 5 mentioned factors in Thanh Hoa province. The question of factors influencing the management of pesticide business activities in the province was done by using Exploratory Factor Analysis and Regression Analysis. The result showed that all the above factors have affected the management of pesticide business in which, the collaboration between the management stakeholders and the awareness and legal compliance of pesticide traders are the most affected while the content and implementation methods of the legal documents are less influence. Based on these results, the paper proposes solutions to improve the management of pesticide trading activities in the coming time in Thanh Hoa province.

### Contribution/ Originality

This work significantly contributes to the literature on the management and business of the pesticide. We show crucial factors influence the management of pesticide business. Based on these results, we propose several recommendations for policymakers and provincial governments to a limited negative effect of pesticides used and to develop sustainable agricultural production as well as ensuring human health and environmental protection.

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## 1. INTRODUCTION

The pesticide is considered as an effective tool in plant pest management. However, the overuse of pesticides is not necessary and does not bring economic efficiency. This situation occurs in many countries, for instance, currently, the use volume of pesticide in the world amounting to 35 million tons/year which equally total value of 45 billion USD (Eyhorn *et al.*, 2015); In which, until 1/3 of this volume does not reach to the standard requirements (Sylviane *et al.*, 2002). From that point of view, the issue of the management of pesticide business is attracting researchers and also the government in several agricultural countries (for instance, see Do *et al.* (2009); Van *et al.* (2013).

Thanh Hoa is a province that has a large area of agricultural production and the thriving crop industry (Ngo *et al.*, 2019). This facilitates Thanh Hoa province to be a potential market for pesticide trading with a strong and diversified network of pesticide supply. Up to December 2016, there were 43 companies registered for pesticide business via 07 major distributors, 1,106 retail shops, and about 420 temporary trading households, selling more than 420 pesticide products in this province inadequate (Thanh Hoa Plant Protection Department, 2016). However, this status of remarked development of the pesticide market also causes many difficulties, challenges, and arises inadequacies in the management of pesticide business concerning: (i). The expired, unqualified, and banned pesticides and pesticides with unclear origin are still present on the market; (ii). There is no storage facility for the confiscated and violated drugs; (iii). The knowledge about pesticides of technical local staff, especially communal authorities are insufficient; (iv). Inspection and examination of pesticide business in the province is inadequate (Thanh Hoa Plant Protection Department, 2016). In 2016, 254 pesticide traders were inspected for 8 times by Thanh Hoa Plant Protection Department, of which 30 pesticide traders were reported to violate the common regulations in terms of business ineligibility, unlisted prices, and lack of storage facilities, and selling pesticides together with animal feed (Thanh Hoa Plant Protection Department, 2016).

To improve the effectiveness of pesticide management in the province, it is essential to first identify the factors affecting the management of pesticide business activities. In this study, the authors surveyed to collect data and evaluate the status of management of pesticide trading activities in Thanh Hoa province, combined with the use of Exploratory Factor Analysis (EFA) and regression analysis, aiming to: (i). Identify factors affecting the management of pesticide trading activities in the province; (ii). Analyse the influencing factors of the management of pesticide trading activities; (iii). Propose solutions to improve the management of pesticide trading activities in the coming time in Thanh Hoa province.

## 2. LITERATURE REVIEW

Management of pesticide business requires the involvement of not only the state, but also the coordination between communities and consumers of agricultural products, and the pesticide production and trading companies (FAO, 2002). According to SRV (2001), the management of pesticide business is the management of the special supply-demand relationship since pesticides are considered "a special good with strict limitations in trade" in all nations. Unlike the "supply-demand" relationship of other goods where there is a "demand", there will be a "supply", that of pesticide products will create "demand" when having "supply". Good management of pesticide trading in the side of "supply" will make an important contribution to prevent the un-registered pesticides and ensure a sufficient supply of qualified pesticides on the market (FAO, 2002).

There is vast literature related to the issues of the factor affecting the management of pesticide in general, and particularly in the management of pesticide trading. Van *et al.* (2001) study the use of pesticides in producing mango which shows that, though the guide of business trader, farmers using more pesticides per year while the yield is not increased. Concerning reducing pesticide use, Eyhorn *et al.* (2015) pointed out that, the current production system, value chains, and policy

environment need to be changed. Accordingly, three groups of factors are required to work together to ensure better management of pesticide reduction: availability of and know-how on alternatives, increasing demand for low-/no-pesticide products, and conducive legislation and policies. In other aspects, [Holland and Rahman \(1999\)](#) study about trends of agricultural pesticide used in New Zealand, they mention that several factors are affecting to the using of a pesticide including nature condition, the agricultural system, system of legal documents, technology, knowledge, the capacity of the management staff...; learning for the case of China, [Fan et al. \(2015\)](#) show that: characteristics of farmers, knowledge, behaviours of pesticide traders, the action of government are factors directly affected to pesticide using behaviours of the farmers. Several other studies also focus on pesticides used behavior of farmers, for instance: [Tijani \(2006\)](#) for the case of Nigeria; [Ntow et al. \(2006\)](#) for the case of Gana; [Williamson et al. \(2003\)](#) for the case of India and Kenya, or [Zhou and Jin \(2009\)](#) for the case of China.

In Vietnam, although there is an increase in the number of studies on the subject of pesticide using and trading, however, the issue of the factor affecting the management of pesticide business is still limited. [Adjrah et al. \(2013\)](#), [Van et al. \(2009\)](#) analyze factors affecting to behaviours of farmers in using a pesticide. The study shows that farmers knowing pesticide by training normally taking care of the brand name of the pesticide; [Van et al. \(2013\)](#) indicate that, an overall improvement of pesticide business management only relies on better government intervention, focusing on more stringent implementation and enforcement of regulation. Several other studies, for instance, [Mengistie et al. \(2015\)](#); [Hoi et al. \(2016\)](#); [Nguyen et al. \(2013\)](#); [Nguyen et al. \(2018\)](#) also emphasize to five main factors affecting the implementation of regulations on the management of pesticide business, including state policies, management apparatus, awareness of pesticide traders, dissemination activities and inspection activities of pesticide business.

According to the author's knowledge, the issue of studying factors affecting to the management of pesticide business has not been done for the case of Thanh Hoa province, and there is still limited literature studying by quantitative methods to address the question of influencing factors to the management of pesticide business in Vietnam.

### 3. METHODOLOGY

#### 3.1. The model and hypotheses

##### 3.1.1. Overview of pesticide business and management in Thanh Hoa province

Based on the secondary data collected from the Plant Protection Department of Thanh Hoa province and the survey results obtained from 4 pesticide distribution companies (level 1-suppliers), the number of pesticide suppliers in the province within the period 2016-2018 is described in table 1.

**Table 1: Current situation of pesticide business in Thanh Hoa province period 2016-2018**

Year	Distributors (level 1- suppliers)	Level 2-suppliers/ shops (Distributors)				Household business (household)	
		Total number (distributor)	Distributors having a technical certificate for pesticide		Distributors having a certificate of eligible pesticide business		
			Quantity	Ratio (%)	Quantity		Ratio (%)
2014	6	616	434	70.45	40	6.49	182
2015	7	838	638	76.13	140	21.94	200
2016	7	1106	786	71.07	428	38.07	420
2018	7	1267	1056	83.34	863	68.11	244

The number of pesticide traders in Thanh Hoa province is relatively high and tends to increase sharply (from 612 distributors/ shops and 182 retail households in 2014 to 1267 distributors/shops and over 244 retail households in 2018). In 2018, the rate of pesticide distributors/ shops doing business without having a technical certificate for pesticide is relatively high, nearly by 32%. Noticeably, there are still 244 temporary household traders who don't have a technical certificate for pesticide and a certificate of eligible pesticide business, accounting for over 16% of the total number of pesticide distributors/ shops in the area. This rate is considered as much higher than that of the surrounding provinces such as Hanoi, Hai Phong and Hai Duong which is ranging from 8 to 11% (Nguyen *et al.*, 2013).

**Table 2: Current situation of pesticide business management in Thanh Hoa province**

Description	2016	2017	2018
<b>1. Issuance and dissemination of legal documents <sup>1</sup></b>			
- State Legal Normative Documents ( <i>Law, Decree, Circular</i> )	17 documents (1 law; 4 decrees và 12 circulars)		
- Provincial Legal Normative Documents ( <i>Resolution, Directive, Plan, Regulation, Official Letter ...</i> )	15 documents (1 resolution, 2 directives, 1 plans, 9 decisions; 2 official letters)		
<b>2. Plan building for business management</b>			
- Plan for inspection (batch)	7	12	9
- Plan for the training of knowledge and skills of pesticide business management (class)	14	8	13
<b>3. Organization of training course and dissemination in business management</b>			
- Training on professional knowledge of pesticide management	2	3	6
- Training on legal documents of pesticide business	7	5	6
- Providing legal normative documents (leaflets)	1500	1800	2400
<b>4. Business inspection and handling of violations</b>			
- Number of inspection (batch)	6	11	8
- Number of inspected distributors/ trader (distributor)	361	310	254
- Violated distributors/ traders (distributor)	83 (22.99%)	48 (15.48%)	30 (11.81%)

The management of pesticide business in Thanh Hoa province is performed under Vietnamese legal documents which are recommended to the Department of Agriculture and Rural Development by the Department of Plant Protection for the implementation. Up to December 2018, the system of legal documents concerning pesticide management in Thanh Hoa province consists of 17 national normative documents and 15 legal documents issued by provincial authorities.

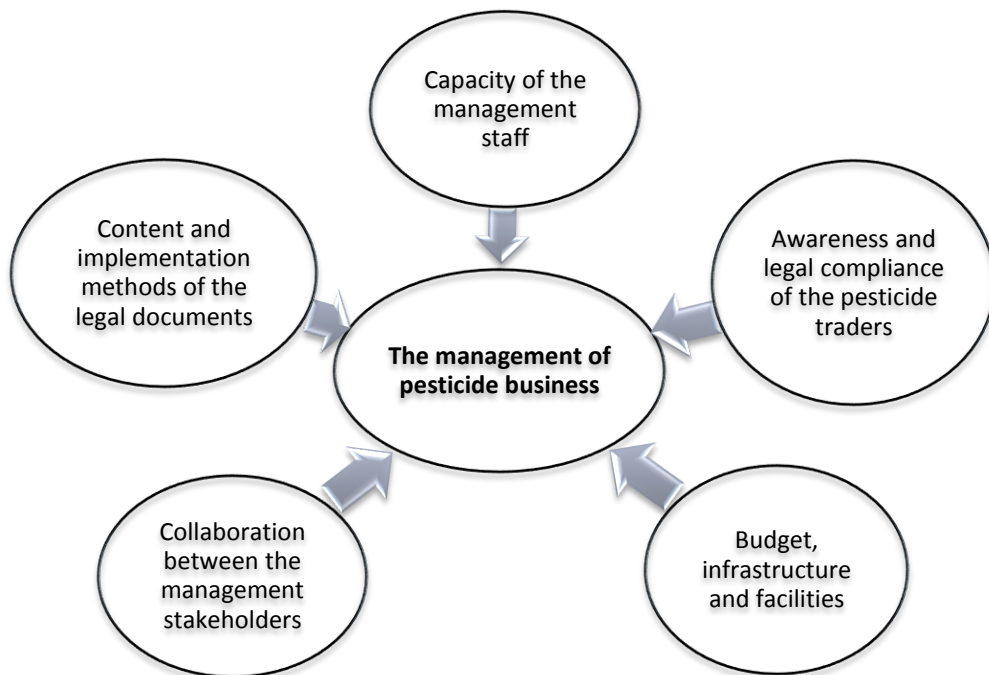
### 3.1.2. The model and hypotheses

According to Eyhorn *et al.* (2015), Holland and Rahman (1999), Van *et al.* (2013) and based on the context of Thanh Hoa province, the author propose the model of affecting factor to the management of pesticide business as the figure following:

In this model, the author proposes five factors affecting to the management of pesticide business, including (i) Capacity of the management staff; (ii) Content and implementation methods of the legal documents; (iii) Awareness and legal compliance of the pesticide traders; (iv) Collaboration between the management stakeholders; and (v) Budget, infrastructure Budget, infrastructure and facilities.

<sup>1</sup> Update in 12/2018

The regression model has presented as follows:



$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + u_i$$

In which: Y: The dependent variable (Outcomes of pesticide business management)

X<sub>i</sub>: The independent variable groups

u<sub>i</sub>: The residual

**Hypotheses:**

H1: Content and implementation methods of the legal documents have a positive effect on the management of pesticide business.

H2: The capacity of the management staff has a positive effect on the management of pesticide business.

H3: Awareness and legal compliance of the pesticide traders have a positive effect on the management of pesticide business.

H4: Budget, infrastructure and facilities for the pesticide management have a positive effect on the management of pesticide business.

H5: Collaboration between the management stakeholders has a positive effect on the management of pesticide business.

**3.2. Data and observation variables description**

According to Hair *et al.* (1998), Hair *et al.* (2009), the sample size affects the generality of the study results by the ratio of observed variables to the independent variables and there should be 5 observed variables for each independent variable in the difference. In order to reach the desired level of the study and achieve the generalized results, there must be 15-20 observations per an independent variable (Hair *et al.*, 1998; Hoang and Chu, 2008). This study consists of 5 independent variables so it is necessary to have at least 120 observations. Therefore, the database used for analysis and assessment was collected by surveying 176 pesticide traders in 5

representative districts in Thanh Hoa province, namely Ngoc Lac, Tho Xuan and Thieu Hoa, Hoang Hoa districts and Thanh Hoa city. The Likert scale from 1 to 5 was used to evaluate the influencing factors by the pesticide traders (the scales are indicated as 1 - Strongly disagree; 2 - Disagree; 3 - Confused; 4 - Agree; and 5 - Strongly agree), corresponding to 05 groups of factors with 27 observational variables, as presented in table 3.

**Table 3: Description of observational variables within the groups of influencing factors**

Factors	Observational variables	Variable codes
1. Content and implementation methods of the legal documents ( $X_1$ )	Overlapping legal texts	CS.1
	Gaps/loopholes in legal documents	CS.2
	Formalism in the dissemination of legal documents	CS.3
	Inappropriate contents of legal documents	CS.4
	Unclear decentralization in management	CS.5
	Non-deterrent sanctions	CS.6
	Rapid changes in the list of pesticides licensed for use	CS.7
2. Capacity of the management staff ( $X_2$ )	Weak qualification of management staff	NL1
	A few numbers of management staff	NL2
	Management capacity of the local authority	NL3
	Partial inspection officials	NL4
3. Awareness and legal compliance of the pesticide traders ( $X_3$ )	Regulations for trading and using pesticides	HB1
	The list of pesticides licensed for use	HB2
	Regulations for the pesticide storage	HB3
	Regulations for the location of pesticide shop	HB4
	Regulations for other products banned to trade together with pesticides	HB5
	Regulations for the eligibility of having the technical certificate for pesticides	HB6
	Reading and providing the guidance of pesticide use for the buyers	HB7
4. Budget, infrastructure and facilities for the pesticide management ( $X_4$ )	Limited budgets, mainly from the state	KP1
	Insufficient annual fund for the pesticide traders	KP2
	Limited socializing funds	KP3
	Limited allowances	KP4
	Inadequate equipment and facilities	KP5
	Lack of infrastructure	KP6
5. Collaboration between the management stakeholders ( $X_5$ )	Collaboration in licensing the certificate for pesticide business	PH1
	Interdisciplinary inspection	PH2
	Coordination between management and dissemination of communal authorities.	PH3
6. Outcomes of pesticide management ( $Y$ )	Eligibility for running pesticide business	KQ1
	Doing appropriate business following the list pesticides permitted for use.	KQ2
	Appropriate handling of damaged pesticides and packaging	KQ3

Data processing was done by using Excel tools and statistic software SPSS 22. Three methods used to analyze data were the statistical description, the exploratory factor analysis and the regression

analysis. The exploratory factor analysis (EFA) was used to sort groups of factors with variable conditions. The observational variables which have a factor loading index less than 0,05 in the EFA were eliminated. This was done along with the Kaiser-Meyer-Olkin (KMO) test ( $\geq 0,5$ ). Bartlett's test has a significant value of less than 0,05. The Cronbach Alpha correlation between the  $x_{ij}$  component variables and the factor group's total variable  $X_i$  (group average) has a value greater than 0,3. Cronbach's Alpha correlation coefficient of each variable has a value of 0,6 or higher (Hair *et al.*, 1998; Hoang and Chu, 2008). After sorting the factor groups, the regression analysis was done to determine the impact of the factor groups on the outcomes of pesticide business management (Y).

## 4. EMPIRICAL RESULT

### 4.1. Result of Cronbach's alpha and exploratory factor analysis

To determine the groups of factors affecting the management outcomes of pesticide business in Thanh Hoa province, we used the exploratory factor analysis with 27 observational variables belonging to 5 groups of influencing factors, using a Likert scale. The average scores of variables according to the Likert scale are summarized in table 4.

**Table 4: Summary of the evaluation on the management of pesticide business by pesticide traders in Thanh Hoa province**

Description	Observational variables	Average score	Standard deviation
1. Content and implementation methods of the legal documents ( $X_1$ )	CS.1	2,24	1,08
	CS.2	2,82	1,05
	CS.3	3,05	1,17
	CS.4	2,90	1,05
	CS.5	2,97	1,20
	CS.6	2,48	0,83
	CS.7	2,85	1,00
2. Capacity of the management staff ( $X_2$ )	NL1	2,80	1,17
	NL2	2,56	1,06
	NL3	2,42	1,03
	NL4	2,77	1,20
3. Awareness and legal compliance of the pesticide traders ( $X_3$ )	HB1	2,10	0,72
	HB2	2,22	0,77
	HB3	2,16	0,74
	HB4	2,09	0,64
	HB5	2,06	0,71
	HB6	1,98	0,69
	HB7	1,96	0,75
4. Budget, infrastructure and facilities for the pesticide management ( $X_4$ )	KP1	1,97	0,59
	KP2	2,03	0,51
	KP3	2,08	0,57
	KP4	1,97	0,65
	KP5	2,31	0,87
	KP6	2,32	0,83
5. Collaboration between the management stakeholders ( $X_5$ )	PH1	2,60	0,97
	PH2	2,66	0,85
	PH3	2,60	0,95

6. Outcomes of pesticide management (Y)	KQ1	2,31	0,55
	KQ2	2,69	0,65
	KQ3	2,33	0,87

The result of conducting Cronbach's alpha reliability shows that there are 3 observational variables eliminated due to nonconformity, namely: HB7- Reading and providing the guidance of pesticide use for the buyers, PH3- Coordination between management and dissemination of communal authorities and CS1 - Overlapping legal texts.

The remained number of observational variables is 24 which are rearranged into 5 affecting factors (Table 5). All selected variables have values of factor loading coefficient greater than 0,5, KMO coefficient is greater than 0,8, Figen values greater than 1, and the variance extracted of 71,03%, suggesting that 5 groups of factors with 24 observational variables are completely suitable and statistically significant.

**Table 5: The matrix of factor loading coefficient within the factors affecting the outcomes of management of pesticide business in Thanh Hoa province**

Observational variables	Groups of influential factors				
	1	2	3	4	5
HB3	0.852				
HB4	0.832				
HB5	0.796				
HB1	0.792				
HB2	0.791				
HB6	0.762				
CS.2		0.820			
CS.3		0.819			
CS.4		0.804			
CS.7		0.800			
CS.5		0.795			
NL1			0.896		
NL2			0.864		
NL4			0.665		
NL3			0.633		
KP6				0.868	
KP5				0.808	
PH2				0.707	
CS.6				0.702	
PH1				0.569	
KP3					0.820
KP2					0.820
KP1					0.749
KP4					0.600
Variance extracted	17.527	16.119	13.378	12.370	11.634
Cronbach's Alpha coefficient	0.904	0.897	0.861	0.835	0.797

**Note:** The groups are ordered from high to low according to the value of factor loading coefficient of observational variables



#### 4.2. Regression analysis

The results from Table 5 indicate that some component variables change their positions within groups 4 and 5. Based on the results of the statistic test and regrouping of the influencing factors, we rearranged the order of influencing factors, as follows:

X<sub>1</sub>: Awareness and legal compliance of the pesticide traders (with 6 observational variables: HB3, HB4, HB5, HB1, HB2, HB6)

X<sub>2</sub>: Content and implementation methods of the legal documents (with 5 observational variables: CS2, CS3, CS4, CS7 and CS5)

X<sub>3</sub>: Capacity of the management staff (with 4 observational variables: NL1, NL2, NL4 and NL3)

X<sub>4</sub>: Collaboration between the management stakeholders (with 5 observational variables: KP6, KP5, PH2, CS.6 and PH1)

X<sub>5</sub>: Budget, infrastructure and facilities for the pesticide management (with 4 observational variables: KP3, KP2, KP1 and KP4).

Using multiple regression functions with 5 independent variables corresponding to 5 factors were tested and rearranged and the dependent variables corresponding to the outcomes of management of pesticide business, combined with the data obtained from the survey of 176 pesticide traders appraised by the management officials in Thanh Hoa province, we analyzed the regression model using statistic software SPSS.22. The coefficients  $\beta_0 - \beta_i$  of the model are summarized in Table 6.

**Table 6: Coefficients of factors affecting the outcomes of pesticide business management in Thanh Hoa province**

Explanation	Variable	Coefficient	Sig
The intercept		0,610***	,000
Awareness and legal compliance of the pesticide traders	X <sub>1</sub>	0,185***	,000
Content and implementation methods of the legal documents	X <sub>2</sub>	0,073**	,003
Capacity of the management staff	X <sub>3</sub>	0,171***	,000
Collaboration between the management stakeholders	X <sub>4</sub>	0,214***	,000
Budget, infrastructure and facilities for the pesticide management	X <sub>5</sub>	0,155***	,001
R <sup>2</sup>		0,684	
F		73,440	
Sig (F)		0,000001	

**Note:** \*\* and \*\*\* refer to as the significance levels of 5% and 1%, respectively

The R square (R<sup>2</sup>) is 0.684, revealing that 5-factor groups used for this model affected the management of pesticide business by 68.40%. The coefficients  $\beta_i$  (i = 1-5) of the independent variables (X<sub>i</sub>) are statistically high at a significance level of 99.9%. We observe that all hypotheses are accepted and the regression function, therefore, demonstrates this relationship as follows:

$$Y = 0.610 + 0.185X_1 + 0.073X_2 + 0.171X_3 + 0.214X_4 + 0.155X_5 + u_i$$

The coefficients  $\beta_i$  are all positive, meaning that those factors affect the outcome of pesticide business management in the same direction. Therefore, the improvement of any influential factors would lead to better management outcomes. Among the influential factors, the coefficient for the collaboration between the management stakeholders (X<sub>4</sub>) has the highest of value, 0.214, followed by ones for the awareness and legal compliance of the pesticide traders (X<sub>1</sub>) with  $\beta_1 = 0.185$ , the

capacity of the management staff ( $X_3$ ) with  $\beta_3 = 0.171$  and the budget, infrastructure and facilities for the pesticide management ( $X_5$ ) with  $\beta_5 = 0.155$ . The lowest value is for the coefficient of the content and implementation methods of the legal documents ( $X_2$ ) with  $\beta_2 = 0.073$ .

The level of effect for the criteria in each group was determined by the regression analysis of the relationship between the observational variables (each group's criteria) and the groups of factors, as summarized in Table 7.

**Table 7: Factors affecting the outcomes of pesticide business management in Thanh Hoa province**

X <sub>1</sub> : Awareness and legal compliance of the pesticide traders		X <sub>2</sub> : Content and implementation methods of the legal documents		X <sub>3</sub> : Capacity of the management staff		X <sub>4</sub> : Collaboration between the management stakeholders		X <sub>5</sub> : Budget, infrastructure and facilities for the pesticide management	
Variable code	Coefficient (X <sub>1</sub> )	Variable code	Coefficient (X <sub>2</sub> )	Variable code	Variable code (X <sub>3</sub> )	Variable codes	Variable code (X <sub>4</sub> )	Variable codes	Variable code (X <sub>5</sub> )
HB1	0.212	CS2	0.306	NL1	0.363	CS6	0.267	KP1	0.299
HB2	0.221	CS3	0.229	NL2	0.325	KP5	0.296	KP2	0.349
HB3	0.231	CS4	0.217	NL3	0.199	KP6	0.323	KP3	0.338
HB4	0.205	CS5	0.194	NL4	0.210	PH1	0.168	KP4	0.216
HB5	0.192	CS7	0.240			PH2	0.260		
HB6	0.171								

**Source:** Result from survey data of author (2018)

Regarding the awareness and legal compliance of the pesticide traders ( $X_1$ ), the most influencing component is the mastery of regulations for the pesticide storage (HB3), followed by that of the list of pesticides licensed for use (HB2). The regulation for the eligibility of having the technical certificate for pesticides (HB1) is ranked as the least influencing component. In term of the content and implementation methods of the legal documents ( $X_2$ ), the biggest impacting component is the gaps/loopholes in the legal documents (CS2), followed by the rapid changes in the list of pesticides licensed for use (CS7) and the unclear decentralization in management (CS5).

Concerning the capacity of the management staff ( $X_3$ ), the most influential component is the weak qualification of management staff (NL1), followed by the low number of management staff. The management capacity of the local authority (NL3) is considered as the smallest influencing component.

In term of the budget, infrastructure and facilities for the pesticide management ( $X_4$ ), the most influential component is the lack of infrastructure (KP6), followed by the inadequate equipment and facilities (KP5) and the collaboration in licensing the certificate for pesticide business (PH1) is ranked as the least influencing one. For the budget, infrastructure and facilities for pesticide management ( $X_5$ ), the most influential component is the insufficient annual training fund for the pesticide traders (KP2), followed by the limited socializing funds (KP3) and the lowest influencing one is the limited allowances (KP4).

Our results correspond to the studies of [Holland and Rahman \(1999\)](#), [Van et al. \(2013\)](#) and [Eyhorn et al. \(2015\)](#) who emphasize that agricultural system, a system of legal documents, technology, knowledge, the capacity of the management staff are key factors affecting to pesticide business management.

## **5. RECOMMENDATIONS**

### **5.1. Enhancement of coordination between management agencies and organizations in monitoring, inspection and violation sanctions of pesticide business**

Increasing the investment in infrastructure and facilities for the management of pesticide business, combined with the assignment of specific responsibilities to authorities at all levels (districts/ towns, communes/ wards/ townships); Promoting the coordination between communal authorities and pesticide management agencies in the inspection and monitoring activities of pesticide business; promptly detecting and handling of violations under the light of Decree 31/2016/ND-CP issued by the Government (SRV, 2016), such as the public announcement of violation cases on local radio system to increase deterrence and prevent violations; and Encouraging socialization and participation of social groups and organizations in management and supervision of pesticide business

### **5.2. Strengthening the dissemination and training activities about professional skills for pesticide traders**

Increasing the quantity and quality of training activities, combined with utilization of the diverse facilities media (television, newspapers, publications, leaflets...) with the aim at popularizing the regulations on pesticide business and the list of pesticides licensed for use issued annually by the Ministry of Agriculture and Rural Development.

### **5.3. Improvement of the management system for pesticide business concerning both the quantity and quality of management staff**

Increasing the private funds for training and researching activities for the pesticide agencies (Department of Cropping and Plant Protection; District Centers of Agricultural Services). These actions help to improve both professional knowledge and skills for management staff, and to keep them updated with new information to meet the requirements of management and constant development of agricultural production; Implementation of staff for inspection activities, which is recommended by Department of Cropping and Plant Protection according to the job position project, need to be carried out promptly with at least 05 provincial inspectors specialized in pesticides. At the district level, there is a need to increase the number of civil servants working in pesticide management. Each district should have at least 1 civil servant being in charge of inspection, supervision and monitoring of pesticide business.

### **5.4. Investment in infrastructure and financial funds for management agencies**

To create favorable conditions for the performance of management activities, ensuring the impartiality and scientific correctness. In particular, it is necessary to encourage socialization of financial fund in combination with the development of programs/ projects for financial funds, equipment, facilities, scientific knowledge and technology, serving the activities of inspection, examination, training and dissemination and improving the quality of pesticide management in the province.

### **5.5. Specific regulations for to practical implementation of legal documents in the province**

Constantly revisiting, revising and supplementing the legal documents according to the regime "doing while reviewing, adjusting, supplementing"; Building and promulgating policies on salaries and working-trip allowances for pesticide inspectors, along with policies on emulation and commendation in the pesticide management activities at all levels.

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