



## WAREHOUSE AND DISTRIBUTION MANAGEMENT OF NATIONAL FOOD AUTHORITY (NFA) RICE IN THE PHILIPPINES: BEST PRACTICES

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### ABSTRACT

*This study aims to assess, establish, or strengthen best practices in warehousing and distribution processes of the National Food Authority (NFA) rice. Good Warehouse and Distribution system includes protection from insects, rodents and birds, ease of loading and unloading, efficient use of space, ease of maintenance and management, and prevention of moisture re-entering the grain after drying. The International Rice Research Institute (IRRI) mentioned in a Journal dated July 2017 that 25 to 50 percent of the total grain value (Quantity and Quality) was lost between harvest and consumption in developing countries. Proper storage is vital to the stability of the country's grain supply. To achieve this end-goal, good warehouse management must be pursued. The National Food Authority (NFA) is one of the most important policy instrumentalities of the Philippine Government with respect to Agricultural price policy and Food security. The study used a combination of quantitative and qualitative design and methodological that obtained credible evidence and conclusion achieved. Quantitative data were collected through the use of structured questionnaire survey between variables as attested by Saunders et al. (2010) Qualitative data, on the other hand, were gathered through the open interview questions with the respondents to acquire a detailed and comprehensive data about sustainability practices in the supply chain management of NFA rice. The result of the study shows that warehouses whether where it is located, Region III or Region XIII and what type, Owned or Lease do not have a Relative Humidity monitoring device. This device is important in monitoring the moisture content of the warehouse. Maintaining a trucker's equipment checklist are industry practice. It is important to avert any delays that might happen in the distribution of rice.*

*Keywords: Best Practices; Post-harvest; Proper Storage; National Food Authority; Relative Humidity; Food Security; Moisture Content.*

### INTRODUCTION

In the Philippines, rice is produced seasonally, whereas its consumption is constant throughout the year. Due to this situation, a warehouse ensures that the seasonality of production will be able to cope with its fairly-uniform demand annually. Therefore, warehousing or storage is practiced to attain a more or less balanced rice supply and demand for any given year. Warehousing or storage is a process of keeping rice in a storage structure to prevent the product from pest and spoilage while

awaiting processing and distribution to other locations. In a similar report by the United Nation Food and Agricultural Organization (FAO), it was mentioned that "Food is lost or wasted throughout the supply chain, from initial agricultural production down to final household consumption" A warehouse or a storage facility is an important component of the post-harvest handling operations of agricultural products such as rice. "Reducing the post-harvest losses, especially in developing countries, could be a sustainable solution to increase food availability, reduce pressure on natural resources, eliminate hunger and improve farmers' livelihoods. Cereal grains



are the bases of staple food in most of the developing nations and account for the maximum post-harvest losses on a calorific basis among all agricultural commodities. As much as 50%–60% of cereal grains can be lost during the storage stage due only to the lack of technical inefficiency”. (Kumar, 2009) Within the palay grain is an embryo which is distinct and perceptible to temperature and relative humidity. If the temperature and humidity could be kept low (i.e., 15 degrees centigrade and 70 percent relative humidity at 14% grain moisture), the embryo will remain viable but inactive. Under these conditions, the palay grain can be stockpiled for a long period. Good Warehousing Practices (GWP) shall be established to ensure that products are stored under sanitary conditions and at the right moisture level, particularly with rice. It mentioned in a report made by International Rice Research Institute (IRRI) regarding shelf-life of rice that white rice can last at least 4-5 years, or even longer if vacuum sealed. The quality of rice impelled by an array of factors, such as the type of rice; its packaging, and how it was stored (Cardona, 2015). With the anticipated increase in the volume of NFA rice in the market, this study assesses the current practices of NFA regarding warehouse and distribution operation. There are some purposes such that it could establish or recommend best practices that help maintain the quality of rice. Best practices that serve as an assessment tool for existing and future accredited NFA warehouses and also private importers. Help improve marketing margin thru efficient Warehousing and Distribution practices.

### FRAMEWORK OF THE STUDY

The conceptual framework adopted for this study grounded on the categories: Efficiency, Responsiveness, Flexibility, and Food Quality. Prashant Rajan (2017) in the theoretical framework of their study “Perception of Performance Indicators in an Agri-Food Supply Chain: A Case Study of India’s Public Distribution System. The adopted theoretical framework and its categories were modified to fit the

requirements of the conceptual framework of the present study so that they give more emphasis on warehousing and distribution management. Aside from the factors identified by Chopra, Lauz Schmidt (2017) in their performance indicator, the researcher, included other Good warehousing practices and distribution management that served as best practices in handling NFA rice regardless of the source whether from their local farmers or thru importation. First - In, First - Out (FIFO) Monitoring, Pest Control Management, Relative Humidity (RH) temperature monitoring type of truck used and the element customer response lead-time. A summary of the performance indicator incorporated to the Theoretical Framework of Chopra, Laux, Schmidt, and Rajan (2017) that became the Conceptual framework of this study were First In, First Out Monitoring; Pest Control Management; Relative Humidity (RH) Monitoring; Inventory Count; Delivery lead-times.

### OBJECTIVES OF THE STUDY

To meet the objective of the study of assessing, establishing, and strengthening the Best Warehousing and Distribution practices of NFA, the information has gathered. Specifically, this study seeks to: 1.) determine the demographic profile of the respondents in terms of Age, Employment Status, Educational Attainment, Location of Warehouse Handled, Type of ownership of warehouse handled. 2.) evaluate the Government regulation, permits and Quality certification Inspection standard applied by the warehouse: MMDA Truck Ban Ordinance, Fire building Inspection, Food Safety Management system (FSMS), Occupational Safety and Health Administration, ISO certification. 3.) analyze the criteria on Good Warehouse Management practices that implemented by the respondents in terms of Warehouse Layout and provision for Adequate storage space. 4.) assess the criteria on Distribution Management practices that implemented by the respondents such as Truck Turnaround report; Order Fill-rate and Delivery lead-time monitoring; Truck Equipment checklist, and Customer Feedback monitoring. 5.) analyze



the significant difference in the implementation of the criteria on warehouse and distribution practices in terms of Warehouse Ownership and Warehouse Location, 6.) identify the prevalent problems that affect the timely distribution of NFA rice, whether Imported or Local. 7.) propose programs or solutions being applied by respondents to enhance the Warehousing and Distribution of both imported and local NFA rice.

**METHODOLOGY**

The researcher used the descriptive approach to amplify knowledge and determine the priority of sustainability practices in storage or warehouse and distribution operation employed by the respondents in this study. The study used a combination of quantitative and qualitative design, and quantitative data were collected through the use of a structured survey questionnaire. Qualitative data, on the other hand, were gathered through the open interview questions with the respondents. The researcher prepared sets of questionnaires based on Independent variables that were being given to respondents. The content of the questionnaire had been made direct, clear, concise, and easy to understand. The respondent of this study were the warehouse-in-charge or managers of NFA warehouses in Region III and Region XIII National Capital Region, Batanes and Lanao province in Mindanao. Simple Random Sampling was used in this study. The advantages of a simple random sample include its ease of use and its accurate representation of the broader population. For validation, the researcher submitted an example of the questionnaire to the adviser for corrections and suggestions to ensure the validity of the instruments. It was validated by three experts of the field of study. Furthermore, the level of reliability was validated after pilot testing it to 30 people using Cronbach alpha. The result was accepted. Majority of the information was gathered from various sources such as journals and online articles. The researcher used of various statistical tools appropriate to the research problems such as the following Frequency and percentage, Weighted Arithmetic

mean, T-TEST for independent sample, and Standard Deviation.

**RESULTS AND DISCUSSIONS**

**1. Demographic profile of Warehouse In-charge of National Food Authority (NFA) for Region 111 and XIII that serves as the respondent of the study as to:**

**1.1 Age**

Table 1. Respondents' Age

Age	f	%
21 – 30 years old	5	9.6
31 – 40 years old	25	48
41 – 50 years old	12	23
51 – 60 years old	8	15.4
More than 60 years old	2	3.8
<b>Total</b>	<b>52</b>	<b>100</b>

The data reveals that most of the respondents belong to the age bracket 31 – 40. The age of the respondents is diverse. Companies that employ workers in wide ranges of age have the advantage of creating a dynamic, multi-generational workforce with a diverse range of skill sets that is beneficial to the company.

**1.2 Employment Status**

The fifty-two (52) respondents are all permanent employees of NFA. The advantage of permanent employees is that they focus on the job they were assigned to and how to do it better. If employees can have an impact on the quality of the products or services, hiring regular employees is preferable as they have more power to control and manage how they work. This way, when one knows the permanent employee is loyal, he can start building their professional development up and provide different training that helps both them as an individual and a company.

**1.3 Educational Attainment**

The respondents are all college graduates. It is consistent with one of the basic requirements of the position of warehouse in-charge that they are college graduates. This data



illustrates the maturity of the respondents in terms of experience and knowledge because of their educational background.

### 1.4 Location of Warehouse Handled

Table 2 illustrates the number of warehouses handled per location in Region 3, which is composed of 7 provinces.

Table 2. Total Number of Warehouses per location

Location	f	%
Region III	41	79
Region XIII NCR	11	21
<b>Total</b>	<b>52</b>	<b>100</b>

The number of respondents as to warehouse location handled are 41 or 79% while Region XIII the respondents are 11 or 21% composed of the National Capital Region (NCR) representing the Central District office, North District office, south and east district office, Batanes and part Mindanao.

### 1.5 Type of Ownership

Table 3. Type of Ownership of Warehouse Handled

Type	f	%
1. Leased	5	10
2. Company-owned	47	90
<b>Total</b>	<b>52</b>	<b>100</b>

The table presents the five leased warehouses used by NFA or 10% of the total while the agency owns a majority or 90%. Additional lease warehouse is added depending on the anticipated volume of rice that they purchased from the local and imported source. The owner of the warehouse facility means having more control over how the products are to be stored.

## 2. Government regulation, permits, and Quality certification Inspection standard applied by the warehouse

Table 4. Government Regulation, Permits, and Quality certification

Items	f	Total Number of Respondent	%
1. MMDA Truck Ban	8	53	15
2. Fire Building Inspection	53	53	100
3. Food Safety & Management System	53	53	100
4. Occupational Safety and Health Administration	53	53	100
5. ISO Certification	11	53	21
6. Others			

NFA warehouses in NCR, under Region XIII, are subject to MMDA truck ban scheme. All NFA warehouses in Region III and XIII maintain a fire building inspection permit as a basic requirement for warehouse establishment. NFA warehouses in Tarlac under Region III have ISO certified warehouses likewise in Cabanatuan City, and other warehouses in Nueva Ecija area were undergoing ISO audit during the conduct of the interview. The Quality Assurance Department of NFA is conducting a similar seminar on Food Safety Management and Occupational safety and health administration to all their warehouses. The implication of having all these certification or adherence to such quality standard made the operation compared to what is being practiced in the industry. It also assured that the product has a quality standard and fit for human consumption.

### 3. Criteria for good Warehouse Management practices implemented by the respondents.

#### 3.1 Warehouse Layout

The data reveals the assessment on the level of implementation of Good Warehousing Practices (GWP) by Respondents as to Warehouse Layout shows an overall weighted mean of 2.9 and 0.15 standard deviation and a verbal interpretation of "Sometimes." The respondents are homogenous in their assessment regarding the level of implementation on the layout of a good





warehouse, as shown by the low standard deviation.

Table 6. Level of Implementation of Good Warehouse Management Practices Specifically lay-out by the Respondents

Items	M	SD	VI
1. Any opening in the floor is guarded or covered	3.92	0.27	Often
2. Installation of Covered Garbage bin is provided and located outside the warehouse	3.87	0.34	Often
3. The plastic curtain is used to cover doors and windows	1.06	0.24	Never
<b>Overall</b>	<b>2.95</b>	<b>0.15</b>	<b>Sometimes</b>

The National Food Authority has designed different capacities of bag warehouses. It serves as a guide in the construction and leasing of NFA storage or warehouse facilities nationwide. Any opening in the floor is guarded or covered and was rated at 3.92 weighted means and a Standard Deviation of 0.27. The verbal interpretation is “Often”. The use of plastic curtain got a weighted mean of 1.06 and a Standard Deviation of 0.24 and a verbal interpretation of “Never.” The purpose of a Plastic curtain strip doors is to create a barrier against flies, insects, vermin, birds and another pest from entering the site without having to reduce natural light and the efficiency of having an open door. Instead of a plastic curtain, all NFA warehouses use screen and nets to minimize the entry of birds. A screen was provided at every opening such as doors, windows, and continuous ridge vent.

### 3.2 Warehouse Environment

The respondents are homogenous in the assessment regarding the level of implementation regarding good warehouse management on warehouse environment. The provision for lighting has a weighted mean of 3.96

and a Standard Deviation of .27 and verbal interpretation of “Often.”

Table 7. Level of Implementation of Good Warehouse Practices Specifically Warehouse Environment by Respondents

Items	M	SD	VI
1. Provision for lighting is check	3.96	0.27	Often
2. Provision for Ventilation is provided	3.5	0.50	Often
<b>Overall</b>	<b>3.8</b>	<b>0.25</b>	<b>Often</b>

Provision for Ventilation was rated with a weighted mean of 3.5 and Standard Deviation of 0.50 and a verbal interpretation of “Often.” Adequate illumination was provided inside and outside the storage structure. In the Warehouse Inspection Checklist used by field personnel of NFA in assessing warehouses, lighting, and ventilation were included as part of Sanitation and Good Housekeeping Practices.

### 3.3 Warehouse Emergency

Table 8. Level of Implementation of Good Warehouse Practices Specifically Warehouse Emergency by the Respondents

Items	M	SD	VI
1. Written Procedure Posted	3.87	0.34	Often
2. Fire Extinguisher Accessible	3.75	0.62	Often
<b>Overall</b>	<b>3.81</b>	<b>0.33</b>	<b>Often</b>

The respondents are homogenous in the assessment regarding the level of implementation regarding good warehouse management on warehouse emergency. Written procedure posted has a weighted mean of 3.87 a Standard Deviation of .34 and a verbal interpretation of “Often.” The use of Fire Extinguisher likewise has a weighted mean of 3.75 and a Standard Deviation .62 and a verbal interpretation of “Often.” In the Journal Rice Postproduction Technology, a technical reference guide use by NFA mentioned that one



of the most important aspects of proper warehouse management is the implementation of warehouse procedures, labels, and signs. Warehouse labeling systems provide order fulfillment service companies with a variety of benefits that are crucial to the success of the system.

### 3.4 General Warehouse Operations

Table 9. Level of Implementation of Good Warehouse Practices Specifically General warehouse operation by the Respondents

Items	M	SD	VI
1. FIFO Monitoring	3.4	0.93	Often
2. Daily Inventory Count	3.2	0.98	Sometimes
3. Pest Control Program	3.8	0.46	Often
<b>Overall</b>	<b>3.5</b>	<b>0.33</b>	<b>Often</b>

The data above presents the overall respondent assessment of GWP on general warehouse operation was rated as “often” with an overall weighted mean of 3.5, with the Standard Deviation of 0.33. FIFO monitoring was rated with a weighted mean of 3.4 and Standard Deviation of .93 and a verbal interpretation as “Often.” The quality of palay and rice are in good condition because of the strict implementation of First-In, First-out (FIFO), stocks earlier received are piled in such a way that it will be convenient to issue such stocks first. The Daily inventory count was rated with a weighted mean of 3.2 and Standard Deviation of 0.98 and a Verbal Interpretation of “Sometimes.” The conduct of daily inventory is the discretion of the Warehouse Manager. All NFA warehouses are implementing the pest control program mandated by the agency. Monthly inspection using a uniform Warehouse Inspection Checklist done unannounced and corrective action required for every non-conformance. The following items are the Practical Warehouse initiatives of NFA to prevent pest/bird/bat infestation: 1.) Hanging of fishnets prevents the dwelling of bats and traps birds inside the warehouse. 2.) Tin cans tied in a rope to create noise and scare birds, bats, and

rodents. 3.) Madre de Cacao leaves placed in not bags and hanged on piles to eradicate insects. 4.) Regular fogging using madre cacao leaves and miracle tree leaves contribute to the maintenance and preservation of quality of stored stocks and reduce the consumption of chemicals. 5.) West Pangasinan insect trap (WPIT) was installed in the warehouse for insect infestation monitoring. 6.) Smudging is conducted using neem tree leaves as alternate to the synthetic pesticide. 7.) Surrounding vegetation was planted with natural insect repellent ornamental trees (neem and eucalyptus).

### 4. Criteria for Distribution Management practices implemented by the Respondents.

Table 10. Level of Implementation on Best Practices on Distribution Management by Respondents

Items	M	SD	VI
1. Truck turn around report	3.71	0.46	Often
2. Order-fill rate monitoring	3.98	0.24	Often
3. Delivery Lead time monitoring	3.96	0.19	Often
4. Truck equipment checklist	1.14	0.49	Never
<b>Overall</b>	<b>3.20</b>	<b>0.21</b>	<b>Sometimes</b>

The respondents are homogenous in their assessment on Truck-turn around, Order-Fill rate monitoring, and Delivery lead time. Truck Equipment checklist has a weighted mean of 1.14 and a Standard Deviation of 0.49 and a verbal interpretation of “Never”. No standard checklist used in monitoring truck equipment. Region 3 warehouses, specifically in Nueva Ecija, conducts truck inspection usually on the trailer bed to determine the cleanliness and no harmful chemical stored inside the truck. The conduct of doing such activity is not documented using a checklist. The truck equipment checklist or pre-trip inspection checklist is a critical step that allows drivers to catch any issues before heading out on the road. Part of its best practices with regards to Distribution is the establishment of a virtual warehouse at disembarkation port of



imported rice. This practice streamlines transfer or distribution of rice to various accredited warehouses. Also, part of its good distribution practice is the Warehouse in Batanes is located near the Pier; thus, the transfer is thru forklift instead of using trucks for transfer saving the agency with transportation and distribution cost

**5. The significant difference in their implementation of the criteria on warehouse and distribution practices with the following variable**

**5.1 Warehouse Location**

Table 11. Comparison of the Assessment of the Respondents regarding Good Warehouse Practices when they are grouped according to their location

Items	Location	t-value	p-value	Significance
Lay Out	Region III	-1.258	P = 0.214	NS
	Region XIII		>0.05	
Environment	Region III	.333	P = 0.740	NS
	Region XIII		> 0.05	
Emergency	Region III	-.628	P = 0.533	NS
	Region XIII		> 0.05	
General Warehouse Operation	Region III	4.00	P = 0.000	VS
	Region XIII		< 0.01	
Distribution	Region III	2.373	P = 0.022	S
	Region XIII		< 0.05	

Results show that there is a significant difference in the assessment of the level of implementation regarding the General Warehouse Operation and distribution, as shown by the P-value, which is less than 0.01 level of significance. It noted from the result that Region III gave the highest assessment than that in

Region XIII. It is in the area of General Warehouse operation, specifically in the field of daily inventory count practices where there is a significant difference in the distribution and the use of a trucker's equipment checklist. Conducting of daily inventory count is the call of the warehouseman and also dependent on the volume of the transaction on a particular day and likewise availability of stocks. Trucker's equipment checklist is a pre-emptive measure to avert delays in deliveries (De Asis, 2017). On the other hand, there is no significant difference in the assessment of the respondents for Region III and Region XIII as to lay-out, environment, and emergency as shown by the p-value which is all greater than 0.05 level of significance. It implies that the respondents for the two different locations are comparable. The other areas, such as Layout, Environment, Emergency, show that there is no significant difference in their assessment. Traditional FIFO is the first to be issued is the first to arrive, but in Rice storage, the batch that has the highest moisture content is the first to be issued through these items where the number one.

**5.2 Warehouse Ownership**

Table 12. Comparison of the Assessment of the Respondents Regarding Good Warehouse Practices when they are grouped according to their type of ownership.

Items	Lease	t-value	p-value	Significance
Lay Out	Owned	.234	P = 0.816	NS
	Lease		> 0.05	
Warehouse Environment	Owned	.462	P = 0.646	NS
	Lease		> 0.05	
Emergency	Owned	.054	P = 0.957	NS
	Lease		> 0.05	
General Warehouse Operation	Owned	2.960	P = 0.016	S
	Lease		< 0.05	
Distribution	Owned and Lease	1.079	P = 0.286	NS
			> 0.05	

Assessment of the Respondents regarding Good Warehousing Management Practices when grouped according to the type of ownership, Owned, and Lease. Results show that there is a significant difference in the assessment of the level of implementation regarding the General Warehouse Operation and distribution, as shown by the P-value, which is less than 0.01 level of significance. It noted from the result that Owned warehouses gave the highest assessment than are leased. It is in the area of General Warehouse operation specifically in the use of a Truckers equipment checklist when grouped according to location; thus, "Trucker's equipment checklist is a pre-emptive measure to avert delays in deliveries." De Asis (2017) Illustrates the comparison of the assessment of the respondents regarding Good Warehousing Management Practices when grouped according to location, Region III, and Region XIII. Results show that there is a significant difference in the assessment of the level of implementation regarding the General Warehouse Operation and distribution, as shown by the P-value, which is less than 0.01 level of significance. It can be noted from the result that Region III gave the highest assessment than that in Region XIII. It is in the area of General Warehouse operation, specifically in the area of daily inventory count practices where there is a significant difference in the distribution and the use of a trucker's equipment checklist.

#### **6. The prevalent problems that affect the timely distribution of NFA rice**

More than one-half of the respondent mentioned weather condition as one of the prevalent problems that affect shipments of rice by the National Food Authority. Shipments of imported rice cannot be unloaded because rain affects the quality of rice. Majority of the imported rice of NFA are bulk shipments not thru the use of container vans. Once wet, it can be "spoiled" unless it will be consumed immediately. This scenario triggered scarcity of the staple in public markets or stock availability. Another problem identified is the late transfer from Port area to the various NFA warehouses, contributing to this

delay was due to the delivery trucks having a hard time distributing NFA rice due to bad weather.

#### **7. Programs or solution applied to enhance the Warehousing and Distribution of both imported and local NFA rice.**

The programs and solution applied to enhance the Warehousing and Distribution of both imported and local NFA rice are the following: 1.) Technology upgrade and some engineering interventions for easy unloading and safe from some weather conditions such as the use of dock leveler. 2.) Timely deliveries of allocated stocks per warehouse based on the demands of accredited retailers and cooperatives. 3.) The use of a virtual warehouse to streamline processes. Stocks instead of being stockpiled inside a warehouse after it was unloaded will be loaded directly into a truck for delivery; paper documentation will be reflected as if it was loaded from a warehouse dock.

#### **CONCLUSIONS**

The following conclusion was drawn from the findings of the research.

1. Rice, before unloading, is checked for moisture content and texture to be classified as Purity A. A sample from the bulk of unloading are fed to the grain moisture analyzer to determine the moisture content. Rice that has a high moisture content are issued first.
2. Relative humidity and temperature of the warehouse are not monitored.
3. One good practice by NFA is the conduct of an unannounced monthly audit of the warehouse to determine compliance with Good Warehousing Practices (GWP).
4. Implementation of Truck equipment checklist under Distribution management is not being observed.
5. Daily Inventory count was not practiced consistently.
6. To implement or promote best practices in their warehouse operation. An annual





award was given to warehouses that have garnered the highest score based on their compliance to the requirement of the warehouse inspection checklist.

7. Aside from using current technology in the management of NFA warehouses, Practical and environmental friendly Warehouse initiatives are being implemented in Region III and Region XIII warehouses.

## RECOMMENDATIONS

To further strengthen best practices of NFA rice in the Philippines. The following recommendation was recommended:

1. NFA warehouse should adopt the Relative humidity monitoring and temperature monitoring inside their warehouses. Checking of moisture content must not only be done during unloading but also its storage.
2. A performance appraisal must also be given to accredited trucker or hauler. The basis for appraisal would be the key performance indicator that will be set by both the trucker and a representative of NFA. Give awards and incentives to truckers who will get a high score based on truckers' checklist.
3. Practical and environmental friendly Warehouse initiatives must be implemented in all warehouses of NFA.
4. Regular fogging using Madre cacao leaves and miracle tree leaves contribute to the maintenance and preservation of quality of stored stocks and reduce the consumption of chemicals.
5. Smudging is conducted using neem tree leaves as alternate to the synthetic pesticide.
6. Surrounding vegetation is planted with natural insect repellent ornamental trees (neem and eucalyptus).
7. Periodic counts might be once every two months or every three weeks, depending on warehouse size and company needs. Leaving too much time between physical counts will leave a company open to several unfortunate surprises.

8. Employees of NFA are encouraged to propose innovations that will further improve warehouse operation. One innovation adapted is the West Pangasinan Insect trap (WPIT). This was proposed by an NFA employee in Region 1 and the initiative is now being applied by NFA and was given due recognition by the Government.

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