

## Role of Government of India's Agricultural Development Schemes in Enhancing Agricultural Productivity in Bihar

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### ABSTRACT

Agriculture plays a vital role in the Indian economy by ensuring food security, employment generation, and rural development. In states like Bihar, where nearly 77% of the workforce is engaged in agriculture and allied activities, improving agricultural productivity is essential for sustainable economic development. The Government of India has implemented several agricultural development schemes such as Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Pradhan Mantri Fasal Bima Yojana (PMFBY), Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), and the Soil Health Card Scheme to strengthen agricultural infrastructure, enhance irrigation facilities, provide financial assistance, and promote scientific farming practices. The present study examines the role of these government initiatives in enhancing agricultural productivity in Bihar. The research adopts a descriptive and analytical design and is based on both primary and secondary data. Primary data were collected through a structured questionnaire from a sample of 120 farmers selected using simple random sampling, while secondary data were obtained from government reports, agricultural statistics, and economic survey publications. Statistical tools such as percentage analysis, tabulation, correlation analysis, and the Chi-square test were used to analyse the data. The findings reveal that government agricultural schemes have significantly contributed to improving agricultural productivity, increasing farmers' income, and encouraging the adoption of modern agricultural practices. Productivity data show that between 2018–19 and 2024–25, rice productivity increased by 16.3%, wheat by 14.5%, maize by 17.2%, and pulses by 20%. Hypothesis testing results also confirm a significant relationship between scheme participation, farmer awareness, and agricultural productivity. However, the study also identifies challenges such as limited awareness, complex application procedures, and delays in receiving benefits. Strengthening extension services and improving awareness programmes are therefore essential to maximize the impact of these schemes and ensure sustainable agricultural development in Bihar.

**Keywords:** Agricultural Productivity, Government Schemes, PM-KISAN, Farmer Awareness, Bihar Agriculture.

### Introduction

Agriculture has historically been the backbone of the Indian economy and continues to play a crucial role in ensuring food security, employment generation, and rural development. In India, a large proportion of the population depends directly or indirectly on agriculture for their livelihood. Among the agrarian states of India, Bihar holds a significant position due to its fertile alluvial soil, favourable climatic conditions, and extensive river systems. Agriculture remains the primary source of livelihood for a large section of the population in the state. According to the Agriculture Department of the Government of Bihar, approximately 77% of the workforce in the state is engaged in agriculture and allied activities, making it one of the most agriculture-dependent states in India.

Bihar has a substantial agricultural base with a net sown area of more than 51 lakh hectares, reflecting the importance of farming in the state's rural economy. The state produces a wide variety of crops including rice, wheat, maize, pulses, oilseeds, fruits, and vegetables. Rice, wheat, and maize are the major staple crops cultivated across different agro-climatic zones of Bihar. Government statistics for 2024–25 indicate that cereal production in Bihar reached approximately 243.91 lakh tonnes, while pulses and oilseeds production were around 3.92 lakh tonnes and 1.24 lakh tonnes respectively. These figures highlight the growing importance of agriculture in ensuring food security and sustaining rural livelihoods in the state.

Despite its strong agricultural potential, Bihar faces several structural challenges such as fragmented landholdings, frequent floods and droughts, limited irrigation infrastructure, low adoption of modern technologies, and inadequate access to institutional credit. These issues often result in lower productivity compared with the national average. To address these challenges and improve farm productivity, the Government of India has implemented several agricultural development schemes aimed at strengthening the agricultural sector. These schemes focus on enhancing irrigation facilities, providing financial assistance to farmers, promoting crop insurance, encouraging modern farming techniques, and improving agricultural infrastructure.

Some of the major government initiatives include PMKSY for expanding irrigation coverage, PMFBY for crop insurance, and PM-KISAN which provides direct income support to farmers. These schemes have played a significant role in improving farmers' access to resources, reducing production risks, and increasing agricultural efficiency. As of August 2025, more than 73.88 lakh farmers in Bihar have benefited from the PM-KISAN scheme, receiving direct financial assistance to support agricultural activities.

Furthermore, agricultural development policies have also contributed to improvements in crop production and diversification. According to the Bihar Economic Survey 2024–25, rice production in the state increased by about 21% and wheat production by around 10.7% in recent years, reflecting the positive impact of improved agricultural practices and government support programmes. These initiatives aim not only to increase agricultural productivity but also to enhance farmers' income and promote sustainable agricultural development.

In this context, it becomes important to examine the effectiveness of agricultural development schemes implemented by the Government of India in improving agricultural productivity in Bihar. Therefore, the present study attempts to analyse the role of government agricultural development schemes in enhancing agricultural productivity in Bihar, focusing on the experiences and outcomes among selected farmers. The study is based on a sample size of 120 farmers, which provides empirical insights into the benefits, challenges, and overall impact of these schemes on agricultural development in the state.

### **Objectives of the Study**

- To examine the major agricultural development schemes implemented by the Government of India in Bihar.
- To analyse the impact of government agricultural development programmes on agricultural productivity in Bihar.
- To assess the level of awareness and utilization of agricultural development schemes among farmers.
- To identify the challenges faced by farmers in accessing and benefiting from these government schemes.

### **Hypotheses of the Study**

- H<sub>01</sub>:** Government agricultural development schemes have no significant impact on agricultural productivity in Bihar.
- H<sub>11</sub>:** Government agricultural development schemes have a significant impact on agricultural productivity in Bihar.
- H<sub>02</sub>:** There is no significant relationship between farmers' awareness of government agricultural schemes and their agricultural productivity.

**H<sub>12</sub>:** There is a significant relationship between farmers' awareness of government agricultural schemes and their agricultural productivity.

**H<sub>03</sub>:** Government agricultural development programmes do not significantly improve farmers' income and access to modern agricultural practices in Bihar.

**H<sub>13</sub>:** Government agricultural development programmes significantly improve farmers' income and access to modern agricultural practices in Bihar.

### Research Methodology

- **Research Design:** The present study adopts a descriptive and analytical research design. The descriptive approach is used to examine the implementation of major agricultural development programmes, while the analytical approach evaluates their impact on agricultural productivity and farmers' awareness. The study focuses on government initiatives such as PMKSY, PMFBY, and PM-KISAN, which aim to improve irrigation, reduce crop risks, and enhance farmers' income. The methodology is structured in accordance with the objectives and hypotheses formulated for the study.
- **Sources of Data:** The study is based on both primary and secondary data. Primary data were collected from farmers through a structured questionnaire to understand their awareness, participation in government schemes, and perceived changes in agricultural productivity. Secondary data were obtained from official publications such as reports of the Ministry of Agriculture and Farmers Welfare, Government of India, Bihar Agriculture Department statistics, Economic Survey reports, and other government sources.
- **Sampling Technique and Sample Size:** A sample of 120 farmers was selected for the study. The respondents were chosen from selected agricultural areas of Bihar using the simple random sampling method to ensure fair representation. The sample includes farmers cultivating major crops such as rice, wheat, maize, and pulses.
- **Variables of the Study:** The study includes both independent and dependent variables. Independent variables include government agricultural development schemes, awareness of farmers, irrigation support, and financial assistance programmes. Dependent variables include agricultural productivity, adoption of improved farming practices, and changes in farmers' income.
- **Tools and Techniques of Analysis:** The collected data were organized and analysed using percentage analysis, tabulation, and comparative analysis. These statistical tools helped interpret farmers' responses and examine the relationship between government schemes and agricultural productivity. The hypotheses were evaluated based on empirical findings obtained from the sample farmers and supported by secondary government data.
- **Scope and Limitations:** The study focuses on selected farmers in Bihar and examines the impact of major agricultural development schemes on agricultural productivity. Since the research is based on a sample of 120 farmers, the findings may not represent all regions of the state. However, the methodology provides a systematic basis for analysing the role of government schemes in enhancing agricultural productivity in Bihar.

### Institutional Framework of Agricultural Development Programmes

Agriculture remains a key sector of Bihar's economy, employing nearly 70–75 percent of the rural population according to the Bihar Economic Survey 2024–25. Despite its strong agricultural base, the sector faces challenges such as fragmented landholdings, limited irrigation facilities, frequent floods, and low adoption of modern agricultural technologies, which often limit productivity and farmers' income.

To address these challenges, the Government of India has introduced several agricultural development programmes implemented in Bihar through coordination between central and state authorities. Major initiatives include PMFBY, PM-KISAN, and the Soil Health Card Scheme, which aim to improve irrigation, provide crop insurance, offer income support, and promote scientific soil management. These programmes play an important role in enhancing agricultural productivity, strengthening farmers' income, and promoting sustainable agricultural development in Bihar, where small and marginal farmers constitute nearly 91 percent of the farming population.

### Coverage and Implementation of Major Schemes in Bihar

The implementation of government agricultural development programmes in Bihar has expanded significantly during the past decade. Increased budget allocation, digital monitoring, and direct benefit transfer mechanisms have strengthened the delivery of these schemes. Below Table 1 shows the coverage of selected government agricultural schemes in Bihar.

**Table 1: Coverage of Major Agricultural Development Schemes**

Scheme	Major Objective	Coverage/Beneficiaries in Bihar
PM-KISAN	Direct income support to farmers	73.8 lakh farmers
PMFBY	Crop insurance coverage	21.5 lakh farmers
PMKSY	Expansion of irrigation coverage	18.2 lakh hectares
Soil Health Card Scheme	Soil testing & nutrient management	1.9 crore soil health cards

Source: Ministry of Agriculture & Farmers Welfare (2025); Bihar Agriculture Department

As presented in above Table 1, PM-KISAN has the highest coverage among farmers in Bihar, benefiting 73.8 lakh farmers, which demonstrates the extensive reach of income support programmes. Crop insurance under PMFBY covers 21.5 lakh farmers, reflecting increasing awareness of risk management tools among farmers. Irrigation infrastructure under PMKSY covers approximately 18.2 lakh hectares, which is significant for a state where monsoon variability affects agricultural production. Additionally, the issuance of 1.9 crore soil health cards indicates a major effort toward promoting scientific farming practices and improving soil fertility management.

### Agricultural Productivity Trends in Bihar

Agricultural productivity refers to the output obtained per unit of land or other agricultural inputs. In Bihar, productivity improvements are closely associated with irrigation expansion, access to improved seeds, and technological adoption supported by government initiatives. Government statistics show that the gross cropped area in Bihar exceeds 78 lakh hectares, while the cropping intensity is approximately 142 percent. Major crops grown in the state include rice, wheat, maize, and pulses. Government interventions focusing on irrigation development and improved input supply have contributed to gradual improvements in crop yields.

### Productivity Growth of Major Crops

Government agricultural statistics indicate noticeable improvements in the productivity of major crops in Bihar. Below Table 2 shows productivity changes in major crops between 2018-19 and 2024-25.

**Table 2: Changes in Productivity of Major Crops in Bihar between 2018-19 and 2024-25**

Crop	Productivity 2018-19 (kg/ha)	Productivity 2024-25 (kg/ha)	Increase(%)
Rice	2450	2850	16.3
Wheat	2750	3150	14.5
Maize	3200	3750	17.2
Pulses	900	1080	20.0

Source: Directorate of Economics and Statistics, Ministry of Agriculture, 2025

As presented in above Table 2, rice productivity increased by 16.3 percent, while wheat productivity increased by 14.5 percent between 2018-19 and 2024-25. Maize productivity rose by 17.2 percent, and pulses recorded the highest growth at 20 percent. These increases coincide with the expansion of irrigation infrastructure and the promotion of modern agricultural inputs through government programmes.

### Importance of Farmer Awareness in Agricultural Policy Implementation

Awareness plays a crucial role in determining the effectiveness of agricultural development programmes. Even when government schemes are well designed, their benefits cannot reach farmers unless they are aware of the schemes and understand how to access them. In Bihar, extension services, agricultural training programmes, and digital platforms have been introduced to improve farmer awareness. Government initiatives such as Krishi Vigyan Kendra's (KVKs) and mobile-based agricultural advisory services provide farmers with information regarding available schemes and improved farming techniques. However, disparities in awareness levels still exist due to differences in literacy, access to extension services, and regional infrastructure.

### Awareness and Utilization Among Sample Farmers

The survey conducted for this study examined awareness and participation levels among 120 farmers. Below Table 3 shows the level of awareness and utilization of major agricultural schemes among the sampled farmers.

**Table 3: Awareness and Utilization of Agricultural Schemes Among Farmers**

Scheme	Farmers Aware (%)	Farmers Benefiting (%)
PM-KISAN	88	72
PMFBY	65	48
PMKSY	52	35
Soil Health Card	58	41

Source: Primary Data, Field Survey of Farmers, 2025

As presented in above Table 3, awareness of PM-KISAN is the highest among farmers at 88 percent, while 72 percent of the surveyed farmers reported receiving benefits from the scheme. Awareness of crop insurance under PMFBY is 65 percent, but only 48 percent reported actual participation. Awareness of irrigation schemes such as PMKSY remains relatively lower at 52 percent, indicating the need for improved extension services.

### Structural Barriers in Scheme Implementation

Despite the large scale of agricultural development programmes, several challenges continue to affect their effective implementation in Bihar. Small landholdings, limited institutional credit, inadequate infrastructure, and bureaucratic delays often reduce the effectiveness of these schemes.

According to government reports, the average landholding size in Bihar is less than 0.6 hectares, which limits farmers' ability to adopt large-scale mechanization and irrigation infrastructure.

### Challenges Reported by Farmers

Farmers often encounter several difficulties while trying to access government agricultural schemes. These challenges may arise due to limited awareness, complicated application procedures, delays in receiving benefits, and insufficient institutional support. Below Table 4 shows the major challenges reported by farmers in accessing government agricultural schemes.

**Table 4: Major Challenges Faced by Farmers**

Challenge	Percentage of Farmers Reporting
Lack of information	32%
Complex application procedures	24%
Delay in receiving benefits	21%
Limited institutional support	13%
Technical and documentation issues	10%

Source: Primary Data, Field Survey of Farmers, 2025

As presented in above Table 4, the most common challenge reported by farmers is lack of information (32%) regarding scheme eligibility and application procedures. Complex documentation and application procedures 24% also discourage farmers from participating in government programmes. Additionally, 21% of farmers reported delays in receiving financial benefits, which reduces the effectiveness of these schemes.

### Hypothesis Testing

#### Testing of Hypothesis 1

**H<sub>0i</sub>:** Government agricultural development schemes have no significant impact on agricultural productivity in Bihar.

**H<sub>1i</sub>:** Government agricultural development schemes have a significant impact on agricultural productivity in Bihar.

#### Statistical Tool Used

To test this hypothesis, the Chi-Square Test is applied to examine the relationship between participation in government agricultural schemes and increase in agricultural productivity among the sampled farmers.

**Observed Frequency Table**

The observed frequency table is prepared to examine the relationship between participation in government agricultural development schemes and the improvement in agricultural productivity among farmers. It shows the distribution of beneficiaries and non-beneficiaries based on whether their productivity increased or not. The summarized data are presented in Table 5.

**Table 5: Government Scheme Participation and Agricultural Productivity**

Participation in Government Schemes	Productivity Increased	No Significant Increase	Total
Beneficiaries of Schemes	55	15	70
Non-Beneficiaries	20	30	50
<b>Total</b>	<b>75</b>	<b>45</b>	<b>120</b>

Source: Based on Primary Field Survey Data

**Expected Frequency Calculation**

Expected frequency formula:

$$E = \frac{\text{Row Total} \times \text{Column Total}}{\text{Grand Total}}$$

Example:

Beneficiaries & Increased Productivity

$$E = \frac{70 \times 75}{120} = 43.75$$

After calculating expected frequencies, the Chi-Square value is computed.

**Table 6: Chi-Square Calculation**

Category	O	E	(O-E) <sup>2</sup> /E
Beneficiaries – Increase	55	43.75	2.89
Beneficiaries – No Increase	15	26.25	4.82
Non-beneficiaries – Increase	20	31.25	4.05
Non-beneficiaries – No Increase	30	18.75	6.75

Source: Based on Primary Field Survey Data

$$\chi^2 = 18.51$$

**Result**

Degree of freedom:

$$df = (r - 1)(c - 1) = (2 - 1)(2 - 1) = 1$$

Table value of  $\chi^2$  at 5% level of significance = 3.84

Since

$$18.51 > 3.84$$

The null hypothesis ( $H_{01}$ ) is rejected.

**Interpretation**

The result indicates that participation in government agricultural development schemes significantly influences agricultural productivity among farmers in Bihar. Farmers benefiting from schemes such as PMKSY, PMFBY, and PM-KISAN report higher productivity improvements compared with non-beneficiaries.

**Testing of Hypothesis 2**

**H<sub>02</sub>:** There is no significant relationship between farmers' awareness of government schemes and agricultural productivity.

**H<sub>12</sub>:** There is a significant relationship between farmers' awareness of government schemes and agricultural productivity.

### Statistical Tool Used

To examine the relationship between awareness level and productivity improvement, Correlation Analysis (Pearson's correlation) is applied.

### Data Used

To analyse the relationship between farmers' awareness of government schemes and agricultural productivity, correlation analysis was applied. The awareness scores and productivity scores of the selected farmer groups are presented in Table 7.

**Table 7: Relationship between Awareness and Productivity of Farmers**

Farmer Group	Awareness Score (X)	Productivity Score (Y)
Group 1	60	65
Group 2	70	72
Group 3	75	78
Group 4	80	82
Group 5	85	88

Source: Based on Primary Field Survey Data

### Correlation Formula

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{(N\sum X^2 - (\sum X)^2)(N\sum Y^2 - (\sum Y)^2)}}$$

After calculation:

$$r = 0.94$$

### Interpretation

The correlation coefficient  $r = 0.94$  indicates a strong positive relationship between awareness of agricultural schemes and agricultural productivity. Since the correlation value is very high and positive, the null hypothesis ( $H_{02}$ ) is rejected and the alternative hypothesis ( $H_{12}$ ) is accepted.

This means that farmers who are more aware of government schemes tend to achieve higher agricultural productivity due to better adoption of improved agricultural practices.

### Testing of Hypothesis 3

**H<sub>03</sub>:** Government agricultural development programmes do not significantly improve farmers' income and adoption of modern agricultural practices.

**H<sub>13</sub>:** Government agricultural development programmes significantly improve farmers' income and adoption of modern agricultural practices.

### Statistical Tool Used

The Chi-Square Test is again applied to examine whether government schemes influence farmers' income and adoption of modern farming practices.

### Observed Frequency Table

The observed frequency table is used to examine the relationship between participation in government agricultural programmes and improvement in farmers' income and adoption of modern farming practices. The distribution of beneficiaries and non-beneficiaries based on improvement status is summarized in Table 8.

**Table 8: Relationship between Scheme Participation and Farming Improvement**

Participation in Schemes	Improved Income & Practices	No Improvement	Total
Beneficiaries	52	18	70
Non-beneficiaries	17	33	50
<b>Total</b>	<b>69</b>	<b>51</b>	<b>120</b>

Source: Based on Primary Field Survey Data

**Chi-Square Calculation**

After calculating expected frequencies and applying the formula:

$$\chi^2 = 16.87$$

**Decision Rule**

Degree of freedom:

$$df = 1$$

Critical value at 5% significance:

$$3.84$$

Since

$$16.87 > 3.84$$

the null hypothesis ( $H_{03}$ ) is rejected.

**Interpretation**

The results indicate that government agricultural development programmes significantly contribute to improving farmers' income and adoption of modern agricultural practices. Access to irrigation, crop insurance, financial assistance, and soil testing facilities encourages farmers to adopt scientific cultivation techniques and improve overall farm productivity.

**Summary of Hypothesis Testing**

The hypotheses formulated for the study were tested using statistical tools such as the Chi-square test and Pearson's correlation analysis in order to examine the relationship between government agricultural development schemes, farmer awareness, and agricultural productivity in Bihar. The results of the analysis indicate that government agricultural schemes play a significant role in improving agricultural productivity, farmers' income, and the adoption of modern farming practices. The Chi-square test results show that participation in government schemes is significantly associated with improvement in agricultural productivity and farmers' income. Similarly, the correlation analysis indicates a strong positive relationship between farmers' awareness of agricultural schemes and their productivity levels. Since the calculated statistical values in all cases are higher than the critical values at the 5 percent level of significance, the null hypotheses are rejected and the alternative hypotheses are accepted. These findings confirm that government agricultural development programmes have a positive and statistically significant impact on agricultural productivity and farming practices in Bihar.

**Table 9: Summary of Hypothesis Testing Results**

Hypothesis	Statistical Test	Calculated Value	Critical Value	Decision	Result
$H_{01}$ : Government agricultural development schemes have no significant impact on agricultural productivity in Bihar	Chi-square Test	18.51	3.84	$H_{01}$ Rejected	Significant impact on productivity
$H_{02}$ : There is no significant relationship between farmers' awareness of schemes and agricultural productivity	Correlation (r)	0.94	—	$H_{02}$ Rejected	Strong positive relationship
$H_{03}$ : Government programmes do not significantly improve farmers' income and adoption of modern practices	Chi-square Test	16.87	3.84	$H_{03}$ Rejected	Significant improvement observed

Source: Based on Primary Field Survey Data and Statistical Analysis

**Findings and Discussion**

The present study examined the role of Government of India's agricultural development schemes in improving agricultural productivity in Bihar using primary data collected from 120 farmers. The findings indicate that government initiatives such as PMFBY, PM-KISAN, and the Soil Health Card Scheme have contributed positively to agricultural development in the state.

The analysis of scheme coverage shows that income support through PM-KISAN has reached the largest number of farmers in Bihar, benefiting about 73.8 lakh farmers, while crop insurance under PMFBY covers 21.5 lakh farmers. Irrigation expansion under PMKSY covers approximately 18.2 lakh hectares, and the distribution of 1.9 crore soil health cards has encouraged scientific soil management practices. These programmes have collectively strengthened the institutional framework for agricultural development in the state.

Productivity data also indicate a gradual improvement in crop yields during the last few years. Between 2018–19 and 2024–25, rice productivity increased by 16.3%, wheat by 14.5%, maize by 17.2%, and pulses by 20%. These improvements correspond with the expansion of irrigation facilities, improved seed usage, and adoption of modern agricultural inputs promoted through government programmes.

The field survey results further highlight the importance of farmer awareness in the effective implementation of agricultural schemes. Among the surveyed farmers, 88% were aware of PM-KISAN, and 72% reported receiving benefits from the scheme. However, awareness and participation levels were relatively lower for PMFBY and PMKSY, indicating that extension services and awareness campaigns still need to be strengthened.

Despite the benefits of these schemes, farmers reported several challenges in accessing government programmes. The most common issue was lack of information (32%), followed by complex application procedures (24%), and delays in receiving benefits (21%). These barriers limit the effectiveness of agricultural policies and suggest the need for simplified procedures and improved institutional support.

The hypothesis testing results also support the positive impact of government schemes on agricultural development. The Chi-square test result for Hypothesis 1 ( $\chi^2 = 18.51$ ) indicates a significant relationship between participation in government schemes and improvement in agricultural productivity. Similarly, the correlation analysis for Hypothesis 2 shows a strong positive relationship ( $r = 0.94$ ) between farmers' awareness of schemes and productivity improvement. The Chi-square test for Hypothesis 3 ( $\chi^2 = 16.87$ ) further confirms that participation in government programmes significantly improves farmers' income and adoption of modern agricultural practices.

Overall, the findings suggest that government agricultural development schemes play an important role in enhancing agricultural productivity, improving farmers' income, and promoting modern farming practices in Bihar. However, improving farmer awareness, simplifying administrative procedures, and strengthening extension services are essential to maximize the benefits of these programmes.

## Conclusion

The findings of the study indicate that Government of India's agricultural development schemes have played a significant role in enhancing agricultural productivity and improving the socio-economic conditions of farmers in Bihar. Programmes such as PMFBY, PM-KISAN, and the Soil Health Card Scheme have contributed to expanding irrigation facilities, providing financial assistance, reducing production risks, and promoting scientific farming practices. The empirical analysis based on a survey of 120 farmers suggests that participation in these schemes positively influences agricultural productivity, farmers' income, and the adoption of modern agricultural practices. The statistical results, including Chi-square and correlation analysis, confirm a significant relationship between scheme participation, farmer awareness, and productivity improvement. However, the study also identifies several challenges such as limited awareness, complex application procedures, and delays in benefit distribution. Therefore, strengthening extension services, improving farmer awareness, and simplifying administrative procedures are essential to enhance the effectiveness of these schemes and promote sustainable agricultural development in Bihar.

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