



Fostering Agricultural Skills for Youth Livelihoods through Natural Resource Capital Generation

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ABSTRACT

The study was conducted during April, 2023–March, 2024 in two blocks of Cooch Behar district and two blocks of Malda district, West Bengal, India to explore the generation of natural resource capital through skill development of youth in Agriculture. From each block two villages were selected randomly. From each block, two villages were selected randomly by making a total of eight villages. An exhaustive list of youth was prepared in these villages, and from each village, 25 respondents were selected randomly through a simple random sampling procedure, making a total sample size of 200 skilled rural youth. The data were collected with the help of structured interview schedule prepared for the study through personal interview method. The data were processed with the help of the statistical tools namely frequency, percentage, mean, standard deviation, coefficient of variation, coefficient of correlation, and multiple regression. The findings emphasized that the variables land holding and youth orientation towards skill development were positively and significantly associated with the variable natural resource capital agricultural implements possession and risk ability were negatively and significantly associated with the variable natural resource capital of the skilled rural youth who were practicing agriculture. It was concluded that the critical role of targeted skill development initiatives in building natural resource capital and fostering long-term livelihood sustainability among rural youth in West Bengal.

KEYWORDS: Agriculture, natural resource capital, livelihood, skills, youth migration

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Data Availability Statement: Legal restrictions are imposed on the public sharing of raw data. However, author have full right to transfer or share the data in raw form upon request subject to either meeting the conditions of the original consents and the original research study. Further, access of data needs to meet whether the user complies with the ethical and legal obligations as data controllers to allow for secondary use of the data outside of the original study.

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1. INTRODUCTION

Natural resource capital plays a major role not only in achieving sustainable development but also in an overall economic growth of a country by investing in youth through education, training, and healthcare can lead to a more productive and innovative workforce; which in turn, can lead to increased economic output and higher living standards (Mungai et al., 2024; Salam, 2024; Ongachi and Belinder, 2025). The Sub-Himalayan region, characterized by its diverse ecosystems and rich natural resources, holds immense potential for sustainable agricultural development. However, the region faces significant challenges, including youth unemployment, rural-to-urban migration, and declining agricultural productivity (Haokip, 2025; Tiwari and Joshi, 2016; Kumar et al., 2021). Skill development always leads to progress of the individual and the kinds of skills and knowledge that he acquires may not be applicable immediately but it always proves to be beneficial in the long run (Kayal and Chowdhury, 2025). Empowering youth to involve in the agriculture offers broader social benefits by skilling the young farmers can engage in sustainable practices that align with Sustainable development goals such as SDG 2 (Zero Hunger) via diversified, nutritious production; SDG 4 (Quality Education) and 8 (Decent Work) through targeted skilling; SDG 13 (Climate Action) by embedding adaptation; and SDG 15 (Life on Land) (Piselli et al., 2019; Pradhan et al., 2025; Das, 2024). For instance, they could revive the traditional knowledge systems such as mixed cropping, use of local seeds, and community-based watershed management while incorporating modern innovations. This kind of approach could preserve cultural heritage and enhances environmental health. Moreover, youth-led initiatives would drive economic growth through increased local production, reduced food imports to villages, and value addition in supply chains (Kansiime et al., 2025). To address these issues, fostering agricultural skills among the youth is crucial for enhancing their livelihoods and promoting natural resource capital generation. By equipping young people with the necessary skills and knowledge, they can engage in sustainable agricultural practices, contribute to food security, and drive economic growth in their communities (Maulu et al., 2021; Songca et al., 2024; Ainomugisha et al., 2026). This approach not only empowers the youth but also ensures the preservation of natural resources and the environment (Huambachano et al., 2022; Piselli et al., 2019). Through targeted training programs such as organic certification, livestock integration, post-harvest processing, and digital tools for market information, access to modern technologies, and support for agribusiness ventures, the Sub-Himalayan region can transform its agricultural landscape and create a brighter future for its youth (Krishnan et al., 2021; Parmar and Jain, 2019; Amit

et al., 2025; Akram et al., 2020; Giwu et al., 2024). In the face of evolving global challenges, the need to equip the younger generation with relevant skills and knowledge has become more pressing than ever. The agricultural sector, particularly in regions with rich natural resources, holds a crucial role in fostering sustainable development and ensuring food security (Consentino et al., 2023; Kansiime et al., 2025). The focus on “Agricultural Skills for Youth Livelihoods through Natural Resource Capital Generation” aims to address this need by empowering young individuals with the necessary competencies to thrive in the agricultural landscape. The Sub-Himalayan region, known for its diverse ecosystems and abundant natural resources, presents a unique opportunity for sustainable agricultural development. However, this region also grapples with significant challenges such as youth unemployment, rural-to-urban migration, and declining agricultural productivity (Hidayatullah, 2026; Dar et al., 2025; Xu et al., 2025). By fostering agricultural skills among the youth, we can create a pathway to enhanced livelihoods and sustainable natural resource management. Access to modern technologies, and support for agribusiness ventures, the Sub-Himalayan region can transform its agricultural landscape and create a brighter future for its youth (Choudhury et al., 2023). Thus, the present paper envisaged to explore the generation of natural resource capital through skill development of youth in Agriculture.

2. MATERIALS AND METHODS

The study was conducted during 2023–2024 (April, 2023–March, 2024) in two blocks of Cooch Behar district (Coochbehar lies between 25°57.47” to 26°36.2” North latitude and between 89°54.35” to 88°47.44” East longitude) and two blocks of Malda district (Latitude range is 24°40’20” N to 25°32’08” N and Longitude range is 87°45’50” E to 88°28’10” E) due to the reason that in these districts the youth were playing a very crucial role in case of making the agricultural enterprise more profitable for enhancing the income and sustaining the livelihood in the rural situation. The multistage and random sampling techniques were followed in case of selecting the respondents of the present study. The districts were selected purposively; the blocks from the chosen districts were selected with the help of simple random sampling procedure. Eight villages were selected from the chosen blocks with the help of simple random sampling method. It was assumed that the rural youth exposed to the skill development programme were statistically at per. An exhaustive list of farm youth within the selected villages was prepared. From this total list, two hundred farm youth where wherein twenty-five youth were from each village selected randomly as respondent for the present study. The Natural Resource

Capital being the predicted variable was conceptualized and operationalized through different dimension namely: Agricultural land productivity, Agricultural land carrying capacity, Biodiversity Composition, Water Sources, quality and use, Access to natural resources, Agricultural land management, Sustainability on Agricultural land, Pressure on Agricultural land these were depicted in the figure 1. The skill development in agriculture occurs through different capacity building approaches for retaining youth in agriculture towards development of sustainable livelihood. The five dimensions of sustainable livelihood through skill development were measured with the help of different modified measurement tools. The data were collected during with the help of the structured interview schedule constructed for the study through personal interview method. The data were processed into Mean, S.D., C.V., Multiple regression analyses.

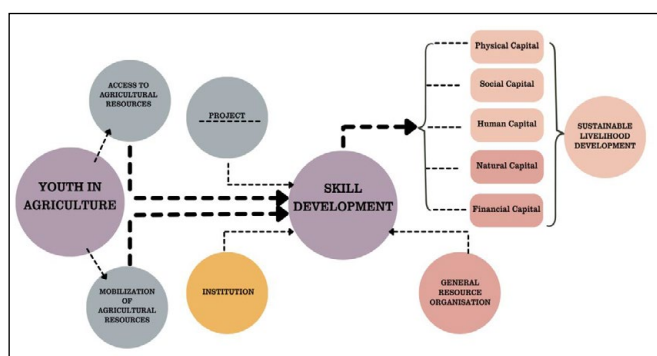


Figure 1: Conceptual framework of the study

3. RESULTS AND DISCUSSION

3.1. Profile characteristics of the respondents

This paper represented the strategic paradigm by developing the skills of youth in Agriculture through sustainable livelihood shown in the figure 2. In Table 1, the results showed that the majority of the respondents (90.00%) were under the age group of 25–34 years followed by <25

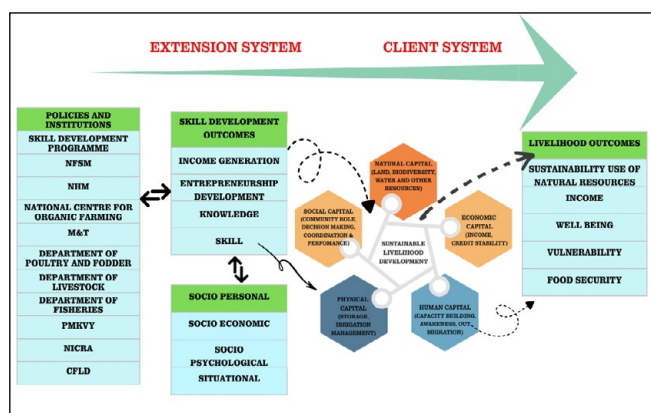


Figure 2: Strategic paradigm

years age group (10.00%) and >34 years age group (0.00%) respectively. The results showed that the majority of the respondents (74.00%) were under the class group of 6–12 class followed by <6 class group (14.00%) and >12 class group (12.00%) respectively. The results showed that the majority of the respondents (67.00%) were under the medium farming experience of 7–14 years followed by <7 low experience group (16.50%) and >14 high experience group (16.50%) respectively. The result showed that the majority of the respondents' family education status fell under the medium family education status (78.00%) followed by low education status category (9.00%) and high education category (13.00%) respectively. The results showed that the majority of the respondents (65.00%) were under the medium annual income of 75–175 followed by <76 low annual income (25.00%) and >175 high annual income (10.00%) respectively. The results showed that the majority of the respondents (65.50%) were under the medium annual expenditure of 69–153 followed by <69 low annual expenditure (23.50%) and >153 high annual expenditure (11.00%) respectively. The results showed that the majority of the respondents (63.00%) were under the medium material possession of 10–17 followed by <10 low material possession (32.00%) and >17 high material possession (5.00%) respectively. The results showed that the majority of the respondents (72.00%) were under the medium agricultural implements possession of 11–19 followed by <11 low agricultural implements possession (13.50%) and >19 high agricultural implements possession (14.50%) respectively. The results showed that the majority of the respondents (70.50%) were under the medium land holding of 1.44–3.0 followed by <1.44 low land holding (14.00%) and >3.0 high land holding (15.50%) respectively. The results showed that the majority of the respondents (87.00%) were under the medium independency of 21–23 followed by <21 low independency (14.50%) and >23 high independency (11.50%) respectively. The results showed that the majority of the respondents (90.00%) were under the medium risk ability of 23–26 followed by <23 low risk ability (14.50%) and >26 high risk ability (4.50%) respectively. The results showed that the majority of the respondents (97.50%) were under the medium economic motivation of 24–26 followed by <24 low economic motivation (2.50%) and >26 high economic motivation (0.00%) respectively. The results showed that the majority of the respondents (87.00%) were under the medium skill development of 40–42 followed by <40 low skill development (7.00%) and >42 high skill development (6.00%) respectively. The results showed that the majority of the respondents (79.50%) were under the medium attitude about agricultural practices of 78–82 followed by <78 low attitude about agricultural practices (5.50%) and >82 high

Table 1: Distribution of the respondent according to the profile characteristics (n=200)						
Sl. No.	Variables	Max.	Min.	Mean	S.D.	C.V. (%)
<u>Socio-personal variables</u>						
1.	Age (X_1)	34	18	28.49	4.06	14.24
2.	Education (X_2)	15	02	8.89	3.05	34.31
3.	Farming experience (X_3)	18	02	10.61	3.74	35.25
4.	Family educational status (X_4)	06	02	3.79	0.72	18.20
<u>Socio-economic variables</u>						
5.	Family annual income (X_5)	300	40	125.27	49.33	39.38
6.	Family annual expenditure (X_6)	250	35	110.56	41.90	37.90
7.	Material possession (X_7)	28	06	13.25	3.60	27.17
8.	Agricultural implements possession (X_8)	30	08	14.85	4.17	28.08
9.	Land holding (X_9)	4.40	0.73	2.24	0.80	35.71
<u>Socio-psychological variables</u>						
10.	Independency (X_{10})	26	18	22.40	1.02	4.55
11.	Risk taking Ability (X_{11})	27	19	24.80	1.36	5.48
12.	Economic motivation (X_{12})	26	21	25.00	0.76	3.04
13.	Youth orientation towards development of skill in Agriculture (X_{13})	44	38	41.00	1.07	2.61
14.	Attitude about Agricultural Practices (X_{14})	87	74	79.74	1.81	2.27
15.	Knowledge acquired (X_{15})	18	13	15.48	0.74	4.78
16.	Skill Acquired (X_{16})	18	13	15.47	0.72	4.65
<u>Situational attributes</u>						
17.	Extension contact (X_{17})	15	09	11.56	0.89	7.70
18.	Mass media exposure (X_{18})	11	05	8.42	1.09	12.95
19.	Social participation (X_{19})	03	01	1.63	0.64	39.26
20.	Training exposure (X_{20})	12	04	6.11	1.34	21.93
<u>Predicted variable</u>						
21.	Natural resource capital	34	31	32.79	0.55	16.77

attitude about agricultural practices (15.00%) respectively. The results showed that the majority of the respondents (88.00%) were under the medium knowledge acquired of 15–16 followed by <15 low knowledge acquired (6.50%) and >16 high knowledge acquired (5.50%) respectively. The results showed that the majority of the respondents (89.50%) were under the medium skill acquired of 15–16 followed by <15 low skill acquired (6.00%) and >16 high skill acquired (4.50%) respectively. The results showed that the majority of the respondents (78.50%) were under the medium extension contact of 11–12.50 followed by <11 low extension contact (14.00%) and >12.50 high extension contact (7.50%) respectively. The results showed that the majority of the respondents (69.50%) were under the medium mass media exposure of 7–9.50 followed by <7 low

mass media exposure (20.00%) and >9.50 high mass media exposure (10.50%) respectively. The results showed that the majority of the respondents (91.00%) are under the medium social participation of 1–2.26 followed by <1 low social participation (0.00%) and >2.27 high social participation (9.00 %) respectively. The results showed that the majority of the respondents (93.00%) were under the medium natural capital of 32–33 followed by <32 low natural capital (0.50%) and >33 high natural capital (6.50%) respectively.

3.2. Correlation coefficient of natural resource capital generation through skill development

Table 2 and figure 3 represented the Pearson's coefficient of correlation among the dependent variable i.e. natural resource capital generation through skill development and 20 causal variables. The result showed that the variables

Table 2: Correlation coefficient of natural resource capital generation through skill development with 20 causal variables

Variables	Coefficient of correlation
Socio-personal	
Age (X_1)	-0.073
Education (X_2)	0.046
Farming experience (X_3)	-0.079
Family education status (X_4)	0.084
Socio-economic	
Annual income (X_5)	0.037
Annual expenditure (X_6)	0.019
Material possession (X_7)	-0.065
Agricultural implements possession (X_8)	-0.194**
Land holding (X_9)	0.170*
Socio-psychological	
Independency (X_{10})	0.032
Risk ability (X_{11})	-0.116
Economic motivation (X_{12})	-0.003
Youth orientation towards skill development	
(X_{13})	0.150*
Attitude about agricultural practices (X_{14})	-0.095
Knowledge acquired (X_{15})	-0.083
Skill acquired (X_{16})	-0.056
Situational attributes	
Extension contact (X_{17})	-0.007
Mass media exposure (X_{18})	-0.053
Social participation (X_{19})	0.035
Training exposure (X_{20})	-0.016

*: Correlation was significant at the 0.05 level (2-tailed);

**: Correlation was significant at the 0.01 level (2-tailed)

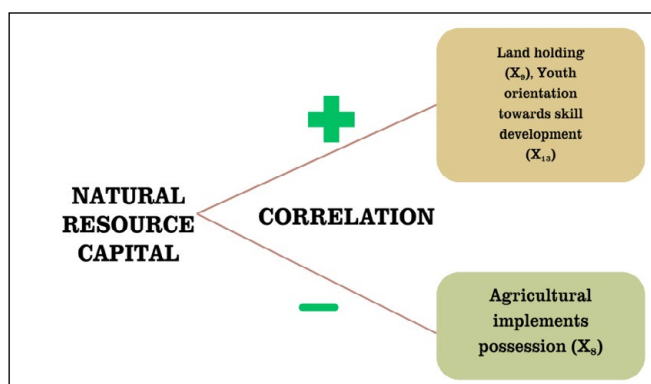


Figure 3: Diagram of correlation coefficient of natural resource capital

namely land holding (X_9) and youth orientation towards skill development (X_{13}) were positively and significantly associated with natural resource capital generation through skill development whereas the variable agricultural implement possession (X_8) was negatively and significantly associated with natural resource capital generation through skill development.

3.3. Landholding and natural resource capital generation through skill development

Land holding indicated the size of the field used for agricultural activity. It was quite natural in the rural societies that the farmers having larger land holding were usually considered as resource rich farmers and these families were often interested towards natural resource capital generation like biodiversity conservation, qualitative use of different natural resources like water, soil etc. Hence, the farmers with higher landholding always tried to explore all the opportunities to enhance their skill to generate the natural resource capital in more quantity and better quality (Kayal and Chowdhury, 2025). This might be the plausible reasons behind the positive and significant relationship between the landholding and the natural resource capital generation through skill development.

3.4. Youth orientation towards skill development and natural resource capital generation through skill development

Skill means the technique of doing anything. A particular activity demands proper skill to accomplish that activity in a desired manner. Now, people of different age groups showed differential orientation towards skill development. But, it was the younger generation who were always positively oriented towards any skill development activity. Hence, it was obvious that the energetic and young rural farmers would be more motivated than other elder farmers for improving their skills towards generating and conserving the natural resource capital through their farming activity (Rakshit et al., 2025; Pradhan et al., 2025). Therefore, the youth with greater and favourable orientation towards skill development would show positive mindset towards natural resource capital generation in their farming practices. This might be the possible reason behind the positive and significant association between youth orientation towards skill development and natural resource capital generation through skill development.

Table 3 and figure 4 reflected the regression analysis result between the natural resource capital and other 18 causal variables. The variables Annual income (X_6) and Social participation (X_{19}) excluded from this analysis due to presence of multicollinearity. The result showed that the variables Land holding (X_9) and Youth orientation towards skill development (X_{13}) were positively and significantly associated with the variable natural resource capital

Table 3: Multiple regression analysis of natural resource capital (Y1) with 18 predictor variables

Variables	Unstandardized coefficients		Standardized coefficients	t-value
	B	Std. Error	Beta	
Socio-personal				
Age (X ₁)	-.002	.023	-.014	-.081
Education (X ₂)	-.003	.014	-.018	-.227
Farming experience (X ₃)	-.008	.025	-.052	-.304
Family education status (X ₄)	.066	.057	.085	1.159
Socio-economic				
Annual income (X ₅)	.002	.012	.015	.140
Material possession (X ₇)	-.006	.013	-.042	-.507
Agricultural implements possession (X ₈)	-.042	.010	-.313	-4.030**
Land holding (X ₉)	.182	.057	.266	3.190**
Socio-psychological				
Independency (X ₁₀)	.055	.042	.102	1.328
Risk ability (X ₁₁)	-.126	.038	-.309	-3.309**
Economic motivation (X ₁₂)	.061	.060	.084	1.018
Youth orientation towards skill development (X ₁₃)	.103	.038	.200	2.729**
Attitude about agricultural practices (X ₁₄)	-.046	.027	-.149	-1.702
Knowledge acquired (X ₁₅)	-.067	.089	-.090	-.752
Skill acquired (X ₁₆)	-.015	.091	-.019	-.160
Situational attributes				
Extension contact (X ₁₇)	.051	.050	.082	1.016
Mass media exposure (X ₁₈)	-.025	.040	-.050	-.627
Training exposure (X ₂₀)	.013	.038	.032	.346

$R^2=0.214$; *: Significant at ($p=0.05$) level; **: Significant at ($p=0.01$) level

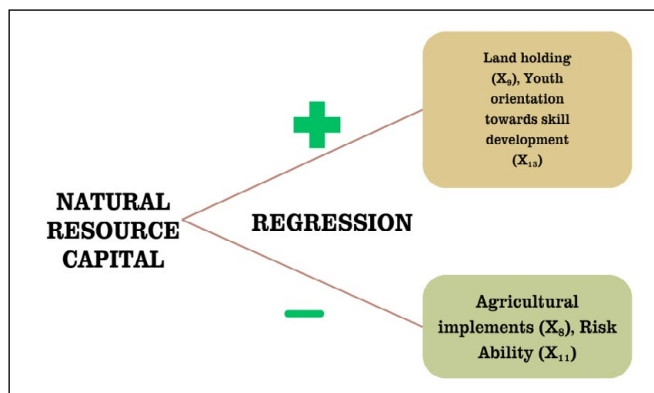


Figure 4: Diagram of multiple regression analysis of natural resource capital

Agricultural implements possession (X_8) and Risk ability (X_{11}) were negatively and significantly associated with the variable natural resource capital of the skilled rural youth who were practicing agriculture.

The R^2 value being 0.214, it was to infer that the eighteen predictor variables put together have explained 21.40% variation embedded with the predicted variable natural resource capital. Still 78.60% variation embedded with predicted one remained unexplained. There was a scope to incorporate more contextual variables for better explicability.

3.5. Agricultural implement possession and natural resource capital generation through skill development

Higher agricultural implement possession reflected the economic affluence of the farming families. In recent time, there has been a huge development in case of design and performance of the modern agricultural implement (Akram et al., 2020; Liu et al., 2025). It has been seen during the present study that the farm families who were in possession of greater and advanced agricultural implements were already more or less in practice of various improved farming practices which focused mainly on the natural resource capital generation and conservation. Therefore, the farm

families with higher agricultural implement possession often showed less interest towards any skill development activity for natural resource capital generation as they have already developed the skill for natural resource capital generation with the help of the modern agricultural implements. Hence, agricultural implement possession showed negative and significant relationship with the natural resource capital generation through skill development (Vallury et al., 2025).

3.6. *Agricultural implements possession and natural resource capital*

Agricultural implements possession meant how much agricultural equipment having in one farmer. We all know that if you have various agricultural equipment the labour cost of the farmer was less (Pavankumar et al., 2025; Xu et al., 2025). So, it was really helpful for a farmer to decrease the cost of cultivation. Now a days farmer was using more agricultural implements in their cultivation practices sometimes it was seen that excessive use of agricultural implements it created harms to the nature. For this reason, agricultural implements possession was negatively characterizing with the dependent variable natural resource capital.

3.7. *Land holding and natural resource capital*

The skilled rural youth who had more land they always wanted to take care of natural resources. Because they knew that how much important the natural resources were for cultivation practices. The farmer who had more land they used more natural resources for their cultivation practices (Pathak et al., 2025; Sembiyeva et al., 2025). If we care the natural resources then the productivity of the land was increase, it enriched the biodiversity composition, the use of appropriate and qualitative use of water resources helped to secure the sustainable livelihood development. For this reasons land holding was positively significant with natural resource capital (Upadhyay et al., 2025).

3.8. *Risk ability and natural resource capital*

Risk ability means capacity of a person to bear risk for performing any type of work. In this study we have seen that the farmer would not ready for taking risk because they already have enough money or income to spend their daily wages. They thought that if they took risk and if they would lose then their daily livelihood activity would hamper and it also hampered their agricultural activities (Ongachi and Belinder, 2025). The farmers who have low amount of money/ land they have more risk taking ability. Because they thought that if they got any chance to raise their income/ land then they would apply their skill training knowledge to perform their activity. For this reason the risk ability was negatively significant with the natural resource capital (Pahala, 2025).

3.9. *Youth orientation towards skill development and natural resource capital*

The rural youth who were taking various types of training related to agriculture their knowledge was getting high and they were doing agricultural practice which was more profitable and they get more return. After getting skill training, they were well known about the agricultural land productivity, biodiversity composition in agricultural land, use of water resources, enhanced the potentiality of youth and appropriate land management. For this reason, youth orientation towards skill development was positively significant with natural resource capital (Amit et al., 2025; Haokip, 2025; Rizavi et al., 2025).

4. CONCLUSION

This study emphasized the skill development's role in reengaging rural youth in agriculture to generate Natural Resource Capital (NRC) collected from Cooch Behar and Malda districts showed land holding and positive attitudes toward skill training significantly predict higher NRC among skilled youth. In contrast, ownership of agricultural implements and greater risk-taking ability negatively associated with NRC. The skill programs were essential for sustainable livelihoods, fostering stronger ties in agriculture and delivering long-term ecological and economic benefits through ongoing investment in youth training.

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