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RECENT TRENDS IN INDIAN AGRICULTURAL DIVERSIFICATION

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ABSTRACT

Approximately, one-third of the world's population were employed in agriculture in 2007. The word agriculture has been derived from the Latin language from *ager* (which means a field) and *cultura* (which means cultivation). Hence, agriculture is the production, processing, marketing and use of foods, fibers and by-products from plants, crops and animals. India is still characterized by a dominance of small and marginal farmer (almost 68 percent) and 75 percent of the farm holding are below 2 hectares. The first Green Revolution was launched to ensure food security. Today, our food supply is well secure. Meeting the growing needs is within reach. Therefore, the second Green Revolution should aim at promoting sustainable livelihood, enabling the poor to come out of poverty by generating gainful self-employment. There are many opportunities of crop diversification both in the irrigated and non-irrigated vast areas in the rural India. We need to launch the second Green Revolution through promotion of agriculture diversification, with a special focus on generation of gainful self-employment for the poor and weaker sections of the society. With the globalization of markets in the WTO era, diversification in agriculture is one means to increase the total production and productivity in terms of quality, quantity and monetary gains under diverse agro-climatic situations of the country. The main objective of this paper is to study the different forms of diversifications, to examine the trends and patterns in Indian agricultural diversifications and also analysis the opportunities and threats related to diversifications.

KEYWORDS

Agriculture, Diversification, Foodgrains, Genetic Engineering, Green Revolution.

INTRODUCTION

Agriculture has played a predominant role in the development of human civilization either in advance countries or in backward countries. In 2007, one-third of the world's population were employed in agriculture. The services sector has overtaken agriculture as the economic sector employing the most people world wide. The word agriculture has been derived from the Latin language from *ager* (which means a field) and *cultura* (which means cultivation). Hence, agriculture is the production, processing, marketing and use of foods, fibers and by-products from plants, crops and animals. The advancement in space and nuclear technologies will soon take India to the group of developed nations. India has already established its leadership in information technology and heavy engineering. The challenge now is to sustain the growth and ensure economic prosperity, particularly in rural areas. Rural development in India requires priority because more than 65 percent of the population are still living in villages and over 85 percent of the rural people are dependent on agriculture for their livelihood. More than 75 percent being small and marginal holders, most of their earnings are utilised to ensure food security. To achieve prosperity, the development strategy should focus on improved agricultural production while generating gainful self-employment for small farmers and weaker sections of the society. Agriculture is the main source of rural employment, but being deprived of irrigation facilities, a majority of the small and marginal farmers are heavily under-employed for 6-8 months in a year. Even under well established irrigated conditions, the growth of the agriculture sector itself has been almost stagnant for the last 8-10 years. Therefore, the policy makers and agriculture experts have been urging for the second Green Revolution to accelerate growth in the agriculture sector. In the 70's, India was successful in creating a Green Revolution which gave a boost to the agriculture sector across the country. Green Revolution accelerated the yields of major food crops such as paddy, wheat, rice and oilseeds, particularly in the states of Punjab, Haryana, some parts of Uttar Pradesh and Rajasthan. We need to create a similar revolution in the near future (www.baif.org.in, www.enwikipedia.org).

OBJECTIVE OF PRESENT STUDY

The objectives of present study are

- To study the different forms of diversifications,
- To examine the trends and patterns in Indian agricultural diversifications and
- Also analysis the opportunities and threats related to diversifications.

NEED OF DIVERSIFICATION IN INDIAN AGRICULTURE

We have already started experiencing stagnation in growth in agricultural production, particularly in the regions which had contributed significantly to the success of the first Green Revolution in 1967-68. Hence, we need to reinforce our technologies and infrastructure to create another Green Revolution. The first Green Revolution was launched to ensure food security. Today, our food supply is well secure. To meet the growing needs is within reach. Therefore, the second Green Revolution should aim at promoting sustainable livelihood, enabling the poor to come out of poverty by generating gainful self-employment. No doubt due to first Green revolution, India's output in agriculture sector was increased but impact of this revolution was only on few food crops like wheat, rice, jowar and there was no significant increase has place in the growth of commercial crops like jute, cotton, tea etc. India is still characterized by a dominance of small and marginal farmer (almost 68 percent) and 75 percent of the farm holding are below 2 hectares. Income of farmers cannot be raised upto the desired level to remove poverty in the India unless existing crop production systems are diversified. Hence following are the needs of diversification in Indian agriculture-

- To increase the income of smallholders.
- To generate additional employment.
- To stabilize farm income over the seasons.
- To conserve natural resource.
- To meet export market demand.
- To meet the changing consumer demand.
- To adopt new farming techniques to meet the higher level of demand not in Indian but also in world.
- To increase community food security.
- To improve fodder for livestock.
- To minimize environmental pollution
- It will help to develop rural infrastructure, which facilitates efficient utilization of local resources (www.enwikipedia.org; www.ap_tokyo.org; (www.baif.org.in))

DIFFERENT FORMS OF DIVERSIFICATION

Different forms of diversification are as following -

1. Supplementing farm income with non-farm income.
2. Increasing the number of crops grown and types of livestock reared and
3. Use of resources in diverse farm enterprise

To encourage the diversification of agriculture a multi-purpose strategy needs to be designed. The concept of 5-Is is helpful to get this objective and the 5-Is are

- i) Incentives – it is concern with the production of those commodities which argument income and generate environment.
- ii) Innovation – related to technology.
- iii) Inputs – availability of inputs required for cultivation
- iv) Institutions – refers to the development of appropriate institutions for new crops eg. , a strong seed sector, credit and insurance institution etc. must exist.
- v) Infrastructure – it refers to the presence of required infrastructure (www.en. Wikipedia. org.)

PATTERN AND TRENDS IN INDIAN AGRICULTURAL DIVERSIFICATION

Diversification becomes necessary for developing countries like India because cereals alone cannot support the economic development. Further diversification can be designed to help poverty alleviation, employment generation and environmental conservation. Pattern of agricultural diversification is as following –

1. **Agricultural Income Diversification** – As per CSO, the aggregate agriculture income consists of income from crop outputs (field and plantation crops), livestock, fisheries and forestry. The sub-sector wise composition of income generated from agriculture, which indicates the degree of diversification, is presented in table 1.

TABLE 1: SHARE OF DIFFERENT SUB-SECTOR IN TOTAL INCOME FROM AGRICULTURE AND ALLIED ACTIVITIES (Percentages)

Agriculture and Allied activities	1950-51	1960-61	1970-71	1980-81	1990-91
Crop Sector	79.50	81.91	79.64	74.77	73.90
Livestock	8.36	8.23	9.71	16.27	19.00
Forestry & Logging	10.91	8.31	8.91	6.99	4.73
Fishing	1.23	1.55	1.74	1.97	2.37
Total (Rs. Crore)	100 (23471)	100 (31995)	100 (40214)	100 (46649)	100 (65653)

Source: www. Nabard.org.

In 1950-51 crop and livestock sectors together contributed 87.86 percent of the income from agriculture, followed by forestry and logging (10.91 percent) and fishing (1.23 percent). By 1990-91 the composition had changed such that the share of crop sector and livestock together increased to 92.90 percent of the income. The share of forestry and logging drastically declined to 4.73 percent. Fishing has gained prominence by nearby double of its share to 2.37 percent (www. nabard org).

TABLE 2: ANNUAL COMPOUND GROWTH RATE OF AGRICULTURE AND ALLIED SECTORS

Period	Crop Output	Livestock	Agriculture	Forestry	Fisheries	Aggregate Agriculture	Overall Economy
1975 / 76	1.8	3.7	1.92	-0.62	2.04	1.72	3.39
1985 / 86	2.21	4.8	3.04	-0.26	5.51	2.93	5.04
1995 / 96	2.98	3.72	5.42	0.95	5.22	3.28	5.87
2003 / 04	2.04	3.5	3.16	1.3	3.27	3.09	7.51

Note : Computed from figures as available from National Statistics

Source: www.iegindia.org

Table 2 depicts that in 2003-04 the annual compound growth rate of agriculture and allied sectors in Indian economy is 7.51 percent. The growth of fisheries has been increased among all sub-sectors.

2. **Diversification Across Sub-sectors of Agriculture** - Sub-sectors of agriculture and their contribution is as following -

a) **Crops-led Diversification** – The crop sector is the principle generating source in agriculture. The share of crop sector in agricultural GDP is 74.60 percent in 1998-99. The crop sector is depicted a steady diversification in India with replacement of foodgrain crops with non-foodgrain crops.

TABLE 3: SHARE OF FOODGRAIN AND NON-FOODGRAIN CROPS IN CROPPING PATTERN AND VALUE OF OUTPUT IN INDIA AT CONSTANT PRICES (PERCENT)

Region	Share of Foodgrain and Non-Foodgrain Crops							
	TE 1981-82				TE 1998-99			
	Foodgrain Crops		Non-foodgrain Crops		Foodgrain Crops		Non-foodgrain Crops	
	Area	Value	Area	Value	Area	Value	Area	Value
Eastern	81.63	51.73	18.37	48.27	73.83	43.04	26.17	56.96
North Eastern	70.11	44.43	29.89	55.77	65.06	35.80	34.94	64.20
Northern	77.42	54.92	22.58	45.08	76.86	53.74	23.14	46.26
Southern	62.86	41.82	37.14	58.18	53.08	28.20	46.92	71.80
Western	71.92	44.44	28.08	55.56	61.85	36.10	38.15	63.90
All – India	70.34	48.05	29.66	51.95	65.44	39.85	34.56	60.15

Source: www.adb.org.

Above table shows that 1998-99, the value of non-foodgrain crops has increased near about 60.15 percent as compare to foodgrains crops (www. adb. org).

b) **Horticulture-led Diversification** – India has great potential in the production of horticulture crops which includes fruits, vegetables, spice, floriculture and plantations. India is the second largest producer of both fruit and vegetables in the world. India occupies first position in the production of cultiflower and second in onion. Trends in production of horticulture crops have been given below.

TABLE 4: TRENDS IN PRODUCTION OF HORTICULTURE CROPS

Crops	2002-03		2003-04		2004-05		2005-06*	
	Area Million Hectare	Production Million Tones	Area Million Hectare	Production Million Tones	Area Million Hectare	Production Million Tones	Area Million Hectare	Production Million Tones
Fruits	4.80	49.20	5.10	49.80	5.30	52.80	5.90	54.40
Vegetables	5.90	84.80	6.70	101.40	7.10	108.20	7.20	113.50
Spices	2.40	3.80	5.20	4.00	3.20	4.90	3.20	5.90
Plantation Crops	3.10	13.10	3.30	9.40	3.10	10.40	3.20	9.80
Flowers	0.10	0.20	0.20	0.60	0.10	0.70	0.10	0.80
Others	0.90	0.90	0.10	0.30	0.40	0.40	0.40	0.50
Total	17.2	152	20.6	165.5	19.2	177.4	20	184.9

Source – National Horticulture Mission

Table 4 conveys that among different crops such as fruits, vegetables, spices, plantations, flowers and others production of vegetables is highest which is near about 113.5 million tonnes in 2005-06. Total production horticulture in 2005-06 is near about 184.9 million tones.

c) **Livestock-led Diversification** – Livestock is often considered as a new source of agricultural growth in the country. CSO presents information related to livestock output separately for milk, meat, egg and wool. India possesses the second largest livestock population in world.

TABLE – 5: STRUCTURAL CHANGES IN THE LIVESTOCK

Items	1970s	1980s	1990s	2000s
Milk Group	59.05	64.23	67.14	69.13
Meat Group	18.14	17.05	17.99	17.83
Eggs	2.21	3.01	3.44	3.68
Wool & Hair	0.62	0.27	0.22	0.20
Dung	18.93	14.23	9.98	8.14
Silkworm	1.04	1.21	1.23	1.02

Note : All values are in percent; figures are the average of particular decade like 1970s is the average of 1970-71 to 1979-80, while 2000s is average of years 2000-01 to 2007-08.

Table 5 shows, that the share of eggs, milk and meat group in total livestock output is increasing while the share of dung, silkworm, wool and hair has decreased (www. iegindia.org).

d) **Fishery** – Fishery is a source of livelihood to over 14 million people and a major source of foreign exchange earner. In 2005-06, this sector contributed about one percent of GDP and 5.3 percent of GDP from agriculture sector.

e) **Agroforestry** - Increasing amounts of land are being degraded while demands for timber, fuelwood and grass for fodder are increasing. The central issue in agroforestry, therefore, is to restore degraded lands. It is an essentially ecofriendly practices that permit gainful exploitation of land to meet the fuel, fodder and timber needs of the population without impairing land productivity. The newly launched Greening India project to extend forest cover to 33 percent in all the states by 2012 is the first step in this direction. It is novel in several respects. The trees to be planted in a particular area are to be selected with their market and value-added potential in view. The target area is 107 million ha of degraded land, including 64 million ha categorized as wasteland.

f) **Genetic Engineering** - It is a powerful tool for improving the yields and quality of both plant and animal foods. Both macro- and micro-nutrient content can be enhanced with the now available and evolving biotech tools. However, safety aspects of GMO foods have become an area of concern and debate, globally. More recently, genetic engineering is being employed in various parts of the world, to create crops with other beneficial traits (www. en.wikipedia.org.)

3. **Agriculture Output Diversification** – It is related to diversification with agricultural production data. Diversification in it is across states. The share of states in the production of selected commodities as presented in table 6.

TABLE 6: THE CHANGES IN STATE'S SHARE IN TOTAL PRODUCTION OF INDIA

States	Rice			Wheat			Total Cereals			Pulses		
	2006/07	2002/04	1982/84	2006/07	2002/04	1982/84	2006/07	2002/04	1982/84	2006/07	2002/04	1982/84
Andhra Pradesh	12.71	10.02	15.31	-	0.02	0.03	7.32	6.02	8.45	9.51	8.94	4.57
Assam	3.31	4.77	4.87	0.09	0.11	0.28	1.47	2.18	2.12	-	0.48	0.42
Bihar	5.34	6.48	7.42	5.16	5.79	5.88	5.25	5.63	6.02	3.10	4.91	5.74
Jharkhand	3.18	2.80	-	0.17	0.16	-	1.68	1.48	-	1.83	1.10	-
Gujarat	1.49	1.13	1.15	3.96	2.07	3.38	2.91	2.51	3.53	4.15	3.55	4.20
Haryana	3.61	3.28	2.46	13.27	13.39	10.04	7.18	7.05	5.05	0.99	0.86	2.75
Himachal Pradesh	-	0.13	0.17	0.66	0.73	0.79	0.61	0.69	0.77	-	0.14	0.09
Jammu & Kashmir	-	0.58	1.09	0.65	0.43	0.51	0.49	0.70	0.92	-	0.16	0.25
Karnataka	3.70	2.96	4.07	0.28	0.20	0.44	4.29	3.38	4.78	6.27	5.46	4.54
Kerala	0.67	0.84	2.43	-	0.00	0.00	0.31	0.37	1.22	-	0.06	0.17
Madhya Pradesh	1.47	1.57	7.63	9.67	8.31	8.97	5.19	5.41	8.79	22.54	21.89	21.61
Chhattisgarh	5.40	4.82	0.00	-	0.15	0.00	2.56	2.31	0.00	3.45	3.14	0.00
Maharashtra	2.75	2.88	4.12	2.15	1.37	2.20	5.09	4.93	7.00	16.20	15.97	9.03
Orissa	7.31	6.08	7.40	-	0.01	0.28	3.42	2.78	3.63	2.46	1.83	8.04
Punjab	10.86	11.58	8.20	19.26	20.93	21.13	12.45	13.41	11.23	-	0.28	1.05
Rajasthan	-	0.14	0.27	9.31	7.82	8.25	6.16	6.13	5.89	10.42	9.80	13.17
Tamil Nadu	7.08	5.75	7.44	-	0.00	0.00	3.92	3.12	4.11	2.04	1.90	1.89
Uttar Pradesh	11.91	12.95	11.67	33.02	35.86	32.32	19.24	21.04	19.83	13.94	17.26	20.52
Uttaranchal	-	0.65	0.00	1.06	1.09	0.00	0.56	0.90	0.00	-	0.24	0.00
West Bengal	15.80	18.21	11.89	1.06	1.37	1.65	7.76	8.68	5.61	1.06	1.46	1.80
All India	100	100	100	100	100	100	100	100	100	100	100	100
All India Prod'n (in lakh tones)	930.36	804.69	534.42	750.81	686.02	439.71	2030.9	1807.8	1282.75	140.20	130.41	122.56

Cont.

States	Oilseeds			Cotton			Sugarcane		
	2006/07	2002/04	1982/84	2006/07	2002/04	1982/84	2006/07	2002/04	1982/84
Andhra Pradesh	1.36	7.36	13.36	9.63	13.04	11.50	6.10	5.91	6.06
Assam	0.13	0.80	1.27	-	0.01	0.03	0.30	0.37	1.16
Bihar	0.15	0.61	1.04	-	0.00	0.01	1.68	1.71	2.27
Jharkhand	-	0.09	-	-	0.00	-	-	0.05	-
Gujarat	2.57	16.79	18.58	38.84	24.18	21.24	4.40	5.17	3.95
Haryana	0.83	4.31	1.23	8.00	11.02	9.94	2.69	3.39	3.13
Himachal Pradesh	-	0.04	0.05	-	0.00	0.01	-	0.03	0.02
Jammu & Kashmir	-	0.41	0.46	-	0.00	0.02	-	0.00	0.01
Karnataka	1.13	5.75	7.91	2.70	3.26	7.70	8.06	9.10	7.72
Kerala	-	0.01	0.11	-	0.05	0.13	-	0.11	0.45
Madhya Pradesh	5.81	20.99	8.89	3.67	4.55	3.81	0.79	0.83	0.99
Chhattisgarh	-	0.57	0.00	-	0.00	0.00	-	0.01	0.00
Maharashtra	3.72	13.56	10.99	20.42	26.00	19.61	22.10	12.26	15.77
Orissa	0.18	0.69	5.63	-	0.59	0.04	0.36	0.31	1.64
Punjab	0.08	0.51	1.11	11.84	11.54	13.45	1.69	3.04	3.14
Rajasthan	5.17	13.72	6.84	3.31	4.00	8.07	-	0.14	0.80
Tamil Nadu	1.08	5.37	9.08	0.97	1.53	3.92	11.57	9.53	8.11
Uttar Pradesh	1.03	4.73	11.54	-	0.05	0.34	37.68	44.41	43.78
Uttaranchal	-	0.14	0.00	-	0.00	0.00	1.72	2.98	0.00
West Bengal	0.65	2.87	1.61	-	0.01	0.00	0.36	0.49	0.71
All India	100	100	100	100	100	100	100	100	100
All India Prod'n (in lakh tones)	240.29	201.74	114.05	220.63	112.91	70.58	3550.52	2594.41	1832.63

Source: www.adb.org.

Table 6 conveys an average share of states in the production of commodities like rice, wheat, cotton, sugarcane etc. Table shows that West Bengal accounted for the highest production of rice, Punjab accounted for wheat, Madhya Pradesh accounted for pulses, Rajasthan accounted for oilseeds, Gujrat accounted for cotton and Utter Pradesh accounted for sugarcane in 2006-2007(www.adb.org).

4. **Diversification Towards Secondary Sector** - Diversification into secondary sector has been taking place in rural economy. Rural non-farm sector includes agro-based industries. Table 7 shows that agro-based industries such as food products, followed by beverages, Tobacco, wood and wood products registered high growth rate during the eighties.

TABLE 7: GROWTH OF AGRO BASED INDUSTRIES

Sr. No.	Industry	Register Sector		Unregister Sector	
		Growth in Gross value of Output		Growth in Net Domestic Product	
		1971-72* 1981-82	1980-81@ 1990-91	1971-72* 1981-82	1980-81@ 1990-91
1.	Food Products	5.0	16.7	3.5	3.4
2.	Beverages and Tobacco	6.8	12.7	5.1	1.3
3.	Textiles	5.3	2.1	5.5	2.6
4.	Wood and Products	-0.7	12.2	0.2	-1.5
5.	Paper and Products	4.8	6.5	8.4	6.6
6.	Leather and Products	1.8	8.6	1.4	1.5
7.	Economy level growth of manufacturing	6.3	7.8	4.2	5.1

Source: Y.K. Alagh (1995), *Agro-based industrialisation in India *in Harish Nayyar and P. Ramaswamy ed., (1995), Globalisation and agricultural marketing. Jaipur: Rawat Publications. Note: * with 1970-71 base; @ with 1980-81 base.

Table 7 conveys that registered sector has shown impressive growth in all the agro-based sectors during the eighties compared to the previous decades. Food products, followed by beverages and tobacco, wood and wood products registered high growth rate during the eighties. In contrast, in respect of unregistered sector the growth rates in net domestic product registered a deceleration during the eighties (www.baif.org.in).

DIVERSIFICATION CAN BE A RESPONSE TO BOTH OPPORTUNITIES AND THREATS

Opportunities which arise due to diversifications are as following -

- **Changing consumer Demand** - As consumers in developing countries become richer, food consumption patterns change noticeably. People move away from a diet based on staples to one with a greater content of animal products (meat, eggs and dairy) and fruits and vegetables. In turn, more dynamic farmers are able to diversify to meet these needs.
- **Changing Demographics** - Rapid urbanization in developing countries has an impact on consumption patterns. Moreover, a smaller number of farmers, in percentage terms at least, have to supply a larger number of consumers.
- **Export Potential** - Developing country farmers have had considerable success by diversifying into crops that can meet export market demand.
- **Adding Value** - The pattern witnessed in the West, and now becoming widespread in developing countries, is for consumers to devote less and less time to food preparation. This provides the opportunity for farmers to diversify into value addition, particularly in countries where supermarkets play a major role in retailing.
- **Changing Marketing Opportunities** - The changing of government policies that control the way in which farmers can link to markets can open up new diversification possibilities. For example, in India policy changes to remove the monopoly of state "regulated markets" to handle all transactions made it possible for farmers to establish direct contracts with buyers for new products.
- **Improving Nutrition** - Diversifying from the monoculture of traditional staples can have important nutritional benefits for farmers in developing countries.

THREATS

Threats are as following -

- **Urbanization** - This is both an opportunity and a threat, in that the expansion of cities places pressure on land resources and puts up the value of the land. If farmers are to remain on the land they need to generate greater income from that land than they could by growing basic staples. This fact, and the proximity of markets, explains why farmers close to urban areas tend to diversify into high-value crops.
- **Risk** - Farmers face risk from bad weather and from fluctuating prices. Diversification is a logical response to both. In fact, farmers often do the opposite of diversification by planting products that have a high price in one year, only to see the price collapse in the next, as explained by the cobweb theory.
- **External Threats** - Farmers who are dependent on exports run the risk that conditions will change in their markets, not because of a change in consumer demand but because of policy changes.
- **Domestic Policy Threats** - Agricultural production is sometimes undertaken as a consequence of government subsidies, rather than because it is inherently profitable. The reduction or removal of those subsidies, whether direct or indirect, can have a major impact on farmers and provide a significant incentive for diversification or, in some cases, for returning to production of crops grown prior to the introduction of subsidies.
- **Climate Change** - The type of crop that can be grown is affected by changes in temperatures and the length of the growing season. Climate change could also modify the availability of water for production. Farmers in several countries, including Canada, India, Kenya, and Sri Lanka have already initiated diversification as a response to climate change (www.en.wikipedia.org).

CONCLUSION AND POLICY IMPLICATIONS

Diversification in agriculture has tremendous impact on the agro-socio-economic impact and uplifting of resource-poor farming communities. It generates income and employment for rural youth year round for the ultimate benefits of the farmers in the country. It implies the use of local resources in a larger mix of diverse cropping systems and livestock, aquaculture and other non-farm sectors in the rural areas. With the globalization of markets in the WTO era, diversification in agriculture is one means to increase the total production and productivity in terms of quality, quantity and monetary gains under diverse agro-climatic situations of the country. There are many opportunities of crop diversification both in the irrigated and non-irrigated vast areas in the rural India.

Demographic factors, technology, infrastructure, political environment and global economic set up are the prime factors that influence the process of diversification. Perpetual inefficiency in agricultural marketing, non-availability of inputs - especially for hi-tech ventures, inadequate priority to research and development, lack of roads, cold storage, pre-cooling facilities, processing, grading and packaging services are few among those factors that constraint the pace of diversification. We need to launch the second Green Revolution through promotion of agriculture diversification, with a special focus on generation of gainful self-employment for the poor and weaker sections of the society. The programme should enhance agricultural production by involving a large number of small farmers and integrate with women empowerment, literacy and development of community organisations, for ensuring its success.

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