

Farm Level Capital Formation in Agriculture: Pattern and Sources of Investment in Southern Karnataka

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ABSTRACT

Farm level capital formation by farmers is largely for the creation of productive assets. An understanding of pattern of investment on capital assets and the source of funds for investment at farm level has greater significance in the present context from the point of view of agricultural development. With this background, the study aims at analysing the farm level agricultural investment in Southern Karnataka specifically focusing on progressive (Tumakuru) and less progressive (Ramanagara) agriculture districts with an objective understanding the pattern of investment and source of funds at farm level. The study revealed that, a lion share was accounted by investment on irrigation structures, livestock and farm machinery and implements, across all type of farms in both progressive and less progressive regions. However, magnitude of investment was different across the region. On an average, in both progressive area and less progressive area, large farmers invested greater amount on farm assets per farm followed by irrigated farmers, small farmers and rainfed farmers. In the progressive area, the irrigation development was the preferred area of investment, where as in less progressive area, it was the livestock. The small and rainfed farmers depended on borrowed funds for investing in assets. In progressive area, institution source of funds played a major role than the non- institutional source of funds and vice versa in less progressive area. On the other hand, the large and irrigated farmers, because of their resource base, made investment from their own sources.

Highlights

- ① Study mainly focuses the importance of sources and pattern of investment of small, large, rainfed and irrigated farmers in progressive and less progressive area in Southern Karnataka.

Keywords: Investment pattern, borrowed funds, owned funds, progressive area, less progressive area

The planners have come a long way since launching of Ist Five Year Plan (FYP) when capital needs of Indian agriculture were deemed to be low. Today the capital needs of agriculture are well recognised for attaining sustained growth. Under such a compelling situation, any decline in capital formation in Indian agriculture is bound to be source of anxiety to planners (Dhawan and Yadav, 1997) and a valid cause for concern to scholars of Indian agriculture.

According to Gulati and Seema (2001), the growth rate in fixed capital formation (FCF) in agriculture has declined during 1980s in contrast to 1970s and 1960s. Fortunately, this decline in capital formation

was not accompanied by a decline in agricultural capital formation on private account which constitutes one-third of total FCF in agriculture. In fact farmers continued to raise their own investment in fixed agricultural assets without offsetting the reduction in FCF on public account.

Capital formation is usually defined as an addition to the stock of productive equipment's over time. But at the present stage of development of Indian agriculture, an assessment of capital formation in agriculture sector may miss many important items of capital formation which are not accounted. This is because of the fact that, majority of Indian agriculturists being poor subsistence farmers

for whom farming is not a business enterprise but a mode of living. Capital investments on the farm generally take place through small bits of acquisitions and activities which led to an improvement in their productive capacity (Saifullah and Masahiro, 2013). Moreover, as a substantial part of capital assets is created through family labour, labour on exchange and material available on the farm without involving money payments, any activity on the part of the farmers which is directed towards augmenting production and income may be taken as index of capital formation (Chung, 1973). This is part of new investments which are directed to increase the level of production and income. Also indicate bits of additional savings almost imperceptibly ploughed back into production.

Sustained investment on productive assets in agriculture is a pre-requisite for augmenting agricultural growth (Shah and Agarwal, 1970). While public investments objective at creating assets and infrastructure in the form of public irrigation, roads, markets and other facilities at macro level which are crucial and gratis for private investment on capital assets by farmers. There has been a serious concern regarding declining trend in public investment in agriculture as debated at various levels by policy maker and economists (Venkataramana, 2012). While there has been lot of research on various dimensions of public capital formation at aggregate level, not much attention has been given to dynamics of private capital formation, especially at farm level (Gulati and Bathla, 2001; Chand, 2001).

As regards capital formation in agriculture in India, about 76 per cent is from private sector (with farm household investment forming over 70 %) and 24 per cent from public sector (Bisaliah *et al.* 2015). This establishes the need to study farm-size-wise capital formation to identify policy options to facilitate farm level capital formation. However, there are hardly any studies conducted on this theme. Hence, the present study aims to address pattern and sources of farm level investment in two regions (progressive and less progressive) of Southern Karnataka.

METHODOLOGY

Study area

The study was conducted in Southern Karnataka.

Tumakuru and Ramanagara districts were selected based on proportion of agricultural gross domestic product of each district to the total agricultural gross domestic product of the state. As per this, Tumakuru representing progressive and Ramanagara representing less progressive district. Tumakuru and Gubbi taluks of Tumakuru district representing progressive taluks and Ramanagara and Magadi taluks of Ramanagara district are representing less progressive taluks.

Random sampling technique was employed for the selection of sample respondents. A total sample of 120 farmers were collected from each district, comprising 60 from each taluk. Thus, the total sample size was 240. Further, the sample farmers were post classified into small and large based on size of holding. Large farms were those who had their land holding size of above 2 hectares, small farms (2 ha and below). Further, farmers were also post classified into rainfed and irrigated farms based on availability of irrigation facility on the farm. The farms which were solely rainfed or dependent on rainfall for agricultural activities were classified as rainfed farms. The farms which had irrigated area along with or without rainfed area were classified as irrigated farms.

Primary data

The necessary information on capital investment on various assets was collected for the period 2009-10 to 2017-18. The data included information on the year of investment and cost of acquisition of different farm assets such as, purchase of agricultural land, land improvements, farm buildings, farm machinery and equipments, investment on livestock, irrigation structures and equipments, and establishment cost of perennial crops

Analytical tools and techniques employed

The actual investment by the respondents in acquiring the capital assets from 2009-10 to 2017-18 (study reference period) has considered. The investment on each asset was brought to current prices of 2017-18 using Wholesale Price Index (WPI) as deflator to account for inflationary effects.

Considering the WPI for all commodities for the period 2009-10 to 2017-18 with the base year 2011-12, the new index was constructed with the base year as 2017-18.

Index with the base year 2017-18 =

$$\frac{\text{WPI value of ith year}}{\text{WPI value of base year 2017-18}} \times 100$$

The current value of capital assets was obtained by using the following formula,

Current values of capital assets at 2017-18 prices =

$$\frac{\text{Capital asset value in ith year}}{\text{Index value of ith year with base 2017-18}} \times 100$$

RESULTS AND DISCUSSION

The pattern and magnitude of capital investment on individual farms depends on many factors such as income of farmers, availability and accessibility of credit and technical knowhow of the farmer. It was observed that relative income of the farmers was higher in progressive districts than less progressive districts. Thus hypothesized that the magnitude of capital formation was higher in progressive area than in less progressive area.

Results pertaining to extent of capital formation in agriculture and its pattern are presented in table 1 and 2. The farm capital assets includes purchase of

land and land improvements, farm buildings, farm machinery and equipment, investment on livestock, irrigation structures and equipments and perennial crops. Both per farm and per hectare capital formation was relatively higher in progressive area (₹ 1456639/ farm and ₹ 752102/ha) compared to less progressive area (₹ 850059/farm and ₹ 501932). Results showed that, major investment was on irrigation structure and equipment's across all types of farms, except small and rainfed farmers. Whilst the small and rainfed farm major investment on livestock implies it acts as buffer zone during adverse effect of climate in both area. (Tables 1 and 2).

Small farmers in progressive area invested more on livestock (37 %) followed by irrigation structures and equipments (35 %). Whereas, in less progressive area, 36 per cent of the investment is accounted for by the livestock and 30 per cent on irrigation structures and equipments. The results are in line with findings of (Mruthyunjaya, 1972) that small farmers invest relatively higher amount per ha on livestock (₹ 114411) and irrigation structures and equipments (₹ 95362) in less progressive area.

Table 1: Pattern of investment on different farm capital assets in progressive area
(Period: 2009-10 to 2017-18 at 2017-18 prices) ₹ (Rupees)

Assets	Small farms (n=88) (Av. area= 0.90Ha.)			Large farms (n=32) (Av. area= 2.96Ha.)			Rainfed farms (n= 30) (Av. area= 1.02Ha.)			Irrigated farms (n=90) (Av. area= 1.97 Ha.)			Pooled farms (n=120) (Av. area= 1.93 Ha.)		
	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent
Purchase of land and land improvements	24003	26484	3	272579	91865	13	26434	25689	8	249118	126130	13	148291	76567	10
Farm buildings	53794	59354	7	129007	43478	6	35465	34465	10	113601	57517	6	91401	47193	6
Farm machinery and equipment	57628	63584	8	547005	184351	25	6561	6376	2	502147	254240	25	302316	156094	21
Livestock	281939	311077	37	275673	92907	13	191157	185767	55	171220	86690	9	278806	143955	19
Irrigation structure and equipment's	261279	288282	35	592677	199744	27	—	—	—	614426	311088	31	426978	220460	29
Perennial crops	76029	83887	10	341666	115148	16	88342	85851	25	338455	171362	17	208847	107833	14
Total	754672	832667	100	2158607	727493	100	347959	338148	100	1988967	1007026	100	1456639	752102	100

Note: Figures in parentheses indicate percentage to the respective totals

Purchase of land and land improvements: Purchase of agricultural land, levelling and bunding

Farm buildings: Cattle shed, pump house and tractor shed

Farm machinery and equipment: Tractor, tiller, cultivator, sprayers, spade, axe,

Livestock: Crossbreed cow, local cow, local buffalo, oxen, sheep and goat

Irrigation structure and equipment's: Irrigation pumpset, borewell, deepening of borewell, drip irrigation, pipes and electrification connection

Perennials: Coconut and arecanut

Table 2: Pattern of investment on different farm capital assets in less progressive area (Period: 2009-10 to 2017-18 at 2017-18 prices) ₹ (Rupees)

Assets	Small farms (n=91) (Av. area= 0.94Ha.)			Large farms (n=29) (Av. area= 2.48Ha.)			Rainfed farms (n= 53) (Av. area= 1.05Ha.)			Irrigated farms (n=67) (Av. area= 1.28 Ha.)			Pooled farms (n=120) (Av. area= 1.69 Ha.)		
	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent	Per farm	Per ha	Per cent
Purchase of land and land improvements	19105	20113	6	287122	117804	21	3224	3047	1	11487	8925	2	153114	90409	18
Farm buildings	44412	46756	15	116770	47910	8	62823	59380	23	134766	104706	18	80591	47586	9
Farm machinery and equipment	13771	14498	5	449372	184374	32	12251	11580	5	166581	129425	22	231572	136736	27
Livestock	108674	114411	36	159608	65486	11	162333	153437	61	138085	107285	18	134141	79206	16
Irrigation structure and equipment's	90580	95362	30	296481	121644	21	—	—	—	223251	173455	30	193531	114274	23
Perennial crops	24571	25868	8	89652	36784	6	27327	25830	10	75961	59018	10	57111	33722	7
Total	301113	317008	100	1399005	574001	100	267958	253274	100	750131	582813	100	850059	501932	100

Note: Figures in parentheses indicate percentage to the respective totals

Purchase of land and land improvements: Purchase of agricultural land, levelling and bunding

Farm buildings: Cattle shed, pump house, tractor shed and silkworm rearing house

Farm machinery and equipment: Tractor, tiller, cultivator, sprayers, spade, axe, gudli, chaff cutter, mountages, iron plough and wooden plough

Livestock: Crossbreed cow, local cow, local buffalo, oxen, sheep and goat

Irrigation structure and equipment's: Irrigation pumpset, borewell, deepening of borewell, drip irrigation, pipes and electrification connection

Perennials: Mango and mulberry

Even though, there was a meagre difference in both areas, small farmers preferred to invest on livestock enterprise in the form of milch cows for year round income in progressive area and in less progressive area. Drip irrigation was the latest method of water management in arecanut and mulberry plantation and most of the small farmers adopted drip structures in their farms.

In the case of large farmers, highest percentage of investment was on irrigation structures (27%) followed by farm machinery and implements (25%) in progressive area. Whereas, investment was more on farm machinery and implements (32 %) in less progressive area. This can be attributed to need of exclusive equipment by sericulture farmers for rearing silk worms.

In both areas, rainfed farmers invested highest on livestock about 55 per cent in progressive area and to their counterpart it was 61 per cent in less progressive area by rainfed farmers. The interesting part is that, scope for development of irrigation

was less in rainfed farmers therefore they preferred livestock to sustain their livelihood and the evidence from the previous studies revealed that reduction of income from crop sector relatively higher than livestock sector. Furthermore livestock is less prone to rainfall and other climatic factors (Gururaj *et al.* 2015). Thus livestock assumes the greater relevance in providing income and employment in rainfed areas and also due to lack of irrigation facilities and non-availability of labours for annual crops, investment on perennial crops was considerable at 25 per cent and 10 per cent in progressive and less progressive areas, respectively. Interestingly, rainfed farmers made higher investment on farm building asset to the extent of 23 per cent in less progressive area compared to 10 per cent in progressive area because of investment on these assets was the predominance of sericulture in this area that needs an exclusive building to rear silkworm scientifically and government also encourages the construction of rearing buildings by the way of subsidies.

It was observed that in progressive area, as expected, irrigated farmers were considerable investment on irrigation structures and equipments than less progressive areas *i.e.*, 31 per cent and 30 per cent, respectively and followed by farm machinery and implements in progressive (25 %) and less progressive areas (22 %). The results were in line with the study by Harishkumar (2017) and Jagadish Kumar (2009).

Over all in progressive area large farmers invested greater amount on farm assets amounting to ₹ 2158607 per farm (₹ 727493 per ha) followed by irrigated farmers (₹ 1988967 per farm; ₹ 1007026 per ha), small farmers (₹ 754672 per farm; ₹ 832667 per ha) and rainfed farmers (₹ 347959 per farm; ₹ 338148 per ha), where as in less progressive area also large farmers accounted for magnitude of ₹ 1399005 per farm (₹ 574001 per ha) followed by irrigated farmers (₹ 750131 per farm; ₹ 582813 per ha), small farmers (₹ 301113 per farm; ₹ 317008 per ha) and rainfed farmers (₹ 267958 per farm; ₹ 253274) (Murukannaiah, 2006). The aggregate capital formation in all farm assets in the progressive area was more than the magnitude of less progressive area across all types farms. Among all assets, farm

machinery and implements, livestock and irrigation structures together account for major investment across all type of farms in both the areas (Seema, 2017).

Apart from knowing the pattern of investment on capital assets, it is equally important to ascertain the source of funds for investment. It could be both owned and borrowed funds. Therefore, it will be an important information as to how much of the capital assets and the type of assets are acquired through owned and borrowed funds. This will definitely help the policy makers in regulating the flow of credit for investment in the desired direction to achieve expected levels of capital formation in agriculture.

The major assets formed through borrowed funds among small farmers were livestock (₹ 284034 per ha; 91%) and farm machinery and implements (₹ 57156 per ha; 90 %) for which institutional finance was also easily available in progressive area (Table 3, Fig. 1) (Venkataramana and Chinnappa Reddy, 2012). Large farmers, uses 90 per cent owned amount invested on perennials (₹ 103633 per ha) followed by irrigation structures (₹ 136356 per ha) during the reference period.

Table 3: Agricultural capital formation through owned and borrowed funds in progressive area (Period: 2009-10 to 2017- 18 at 2017- 18 prices) (₹/ha)

Particulars	Small farms (n=88)			Large farms (n=32)			Rainfed farms (n= 30)			Irrigated farms (n=90)			Pooled farms (n=120)		
	(Av. area= 0.90 Ha.)			(Av. area= 2.96 Ha.)			(Av. area= 1.02 Ha.)			(Av. area= 1.97 Ha.)			(Av. area= 1.93 Ha.)		
	O	B	Total	O	B	Total	O	B	Total	O	B	Total	O	B	Total
Purchase of land and land improvement	25486 (96)	997 (4)	26484 (100)	24057 (26)	67807 (74)	91865 (100)	25689 (100)	—	25689 (100)	14010 (11)	112120 (89)	126130 (100)	24477 (32)	52358 (68)	76835 (100)
Farm buildings	44023 (74)	15331 (26)	59354 (100)	26602 (61)	16876 (39)	43478 (100)	15198 (44)	19267 (56)	34465 (100)	38980 (68)	18537 (32)	57517 (100)	30785 (65)	16572 (35)	47358 (100)
Farm machinery and equipments	6428 (10)	57156 (90)	63584 (100)	106228 (58)	78123 (42)	184351 (100)	6376 (100)	—	6376 (100)	173947 (68)	80293 (32)	254240 (100)	83167 (53)	73474 (47)	156641 (100)
Live stock	27043 (9)	284034 (91)	311077 (100)	59037 (64)	33870 (36)	92907 (100)	55238 (30)	130530 (70)	185767 (100)	49747 (57)	36943 (43)	86690 (100)	51732 (36)	92727 (64)	144459 (100)
Irrigation structures and equipment	132996 (46)	155287 (54)	288282 (100)	136356 (68)	63388 (32)	199744 (100)	—	—	—	192936 (62)	118152 (38)	311088 (100)	136044 (61)	85188 (39)	221232 (100)
Perennial crops	33554 (40)	50332 (60)	83887 (100)	103633 (90)	11515 (10)	115148 (100)	17170 (20)	68681 (80)	85851 (100)	137089 (80)	34272 (20)	171362 (100)	87541 (81)	20669 (19)	108211 (100)
Total	269530 (38)	563137 (62)	832668 (100)	455914 (63)	271579 (38)	727493 (100)	119671 (35)	218478 (65)	338148 (100)	606709 (60)	400317 (40)	1007026 (100)	413747 (55)	340988 (45)	754735 (100)

Note: O = Owned, B =Borrowed.

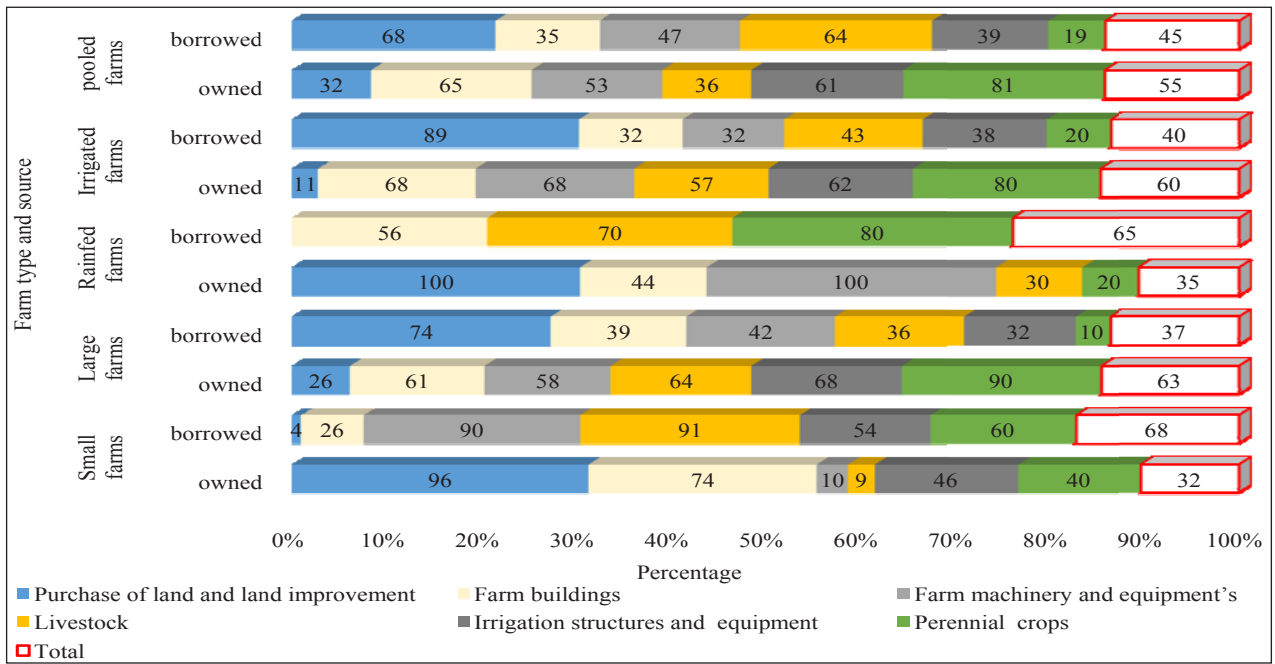


Fig. 1: Agricultural investment through owned and borrowed funds in progressive area (in %)

Table 4: Agricultural capital formation through owned and borrowed funds in less progressive area (Period: 2009-10 to 2017-18 at 2017-18 prices) (₹ /ha)

Particulars	Small farms (n=91) (Av. area= 0.94 Ha.)			Large farms (n=29) (Av. area= 2.48 Ha.)			Rainfed farms (n= 53) (Av. area= 1.05 Ha.)			Irrigated farms (n=67) (Av. area= 1.28 Ha.)			Pooled farms (n=120) (Av. area= 1.69 Ha.)		
	O	B	Total	O	O	B	Total	O	O	B	Total	O	O	B	Total
Purchase of land and land improvement	20115 (100)	—	20115 (100)	66517 (56)	51287 (44)	117804 (100)	3047 (100)	—	3047 (100)	7073 (79)	1852 (21)	8925 (100)	53618 (59)	36982 (41)	90600 (100)
Farm buildings	21704 (46)	25052 (54)	46756 (100)	27172 (57)	20737 (43)	47910 (100)	9675 (16)	49705 (84)	59380 (100)	40591 (39)	64115 (61)	104706 (100)	25693 (54)	21994 (46)	47687 (100)
Farm machinery and equipments	4060 (28)	10438 (72)	14498 (100)	115693 (63)	68681 (37)	184374 (100)	8577 (74)	3003 (26)	11580 (100)	43038 (33)	86387 (67)	129425 (100)	84566 (62)	52458 (38)	137025 (100)
Live stock	36365 (32)	78045 (68)	114411 (100)	57175 (87)	8311 (13)	159608 (100)	17759 (12)	135678 (88)	153437 (100)	92510 (86)	14775 (14)	107285 (100)	51448 (65)	27925 (35)	79373 (100)
Irrigation structures and equipment	41669 (41)	53693 (59)	95362 (100)	113444 (93)	8200 (7)	121644 (100)	—	—	—	80549 (44)	92905 (56)	173455 (100)	93513 (78)	21002 (22)	114515 (100)
Perennial crops	10347 (40)	15520 (60)	25868 (100)	33105 (90)	3678 (10)	36784 (100)	5166 (20)	20664 (80)	25829 (100)	47214 (80)	11803 (20)	59018 (100)	26780 (79)	7014 (21)	33794 (100)
Total	134259 (42)	182749 (58)	317009 (100)	413107 (72)	16089 (28)	574001 (100)	46788 (17)	221170 (83)	267958 (100)	310974 (53)	271839 (47)	582813 (100)	335618 (66)	167376 (34)	502994 (100)

Note: O = Owned, B =Borrowed.

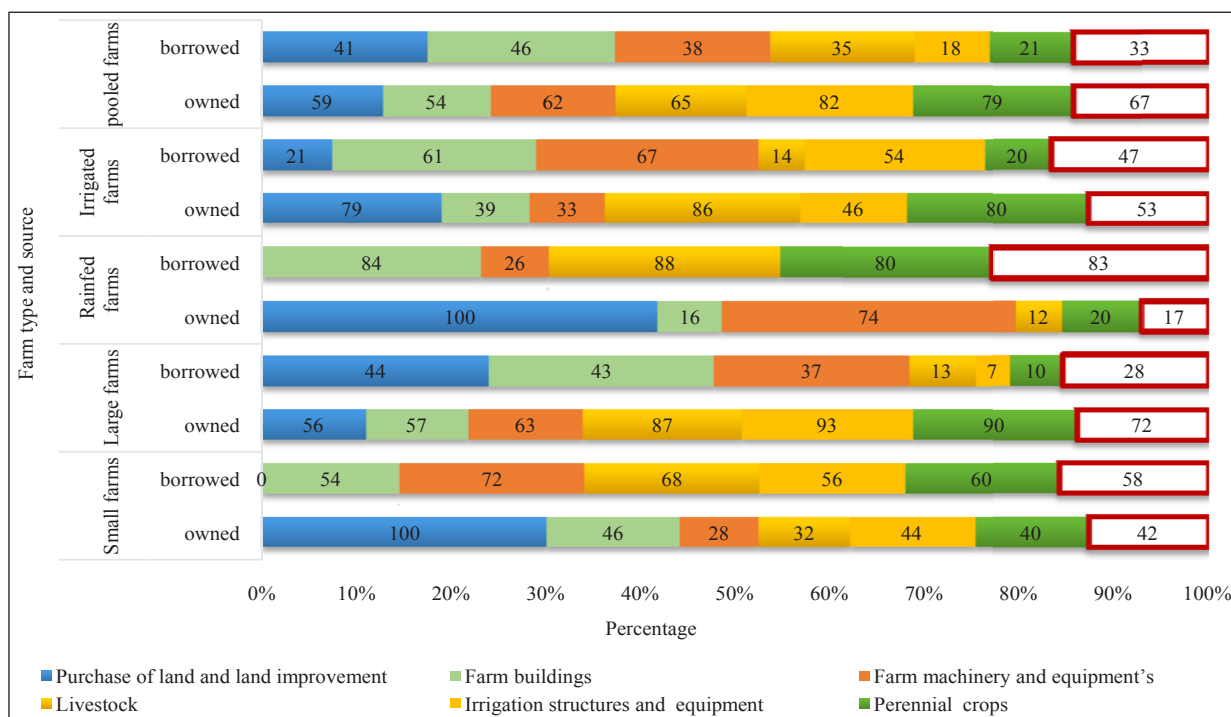


Fig. 2: Agricultural investment through owned and borrowed funds in less progressive area (in %)

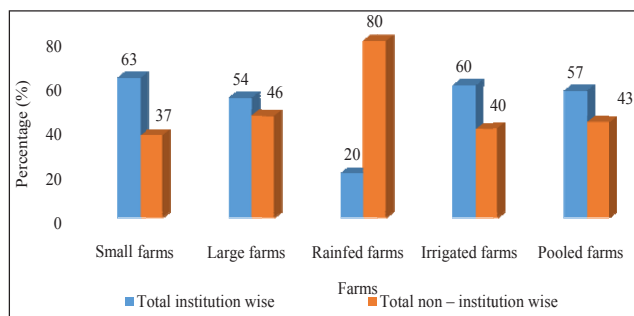


Fig. 3: Sources of borrowed funds for farm capital formation in progressive area (Institution wise and Non- Institution wise)

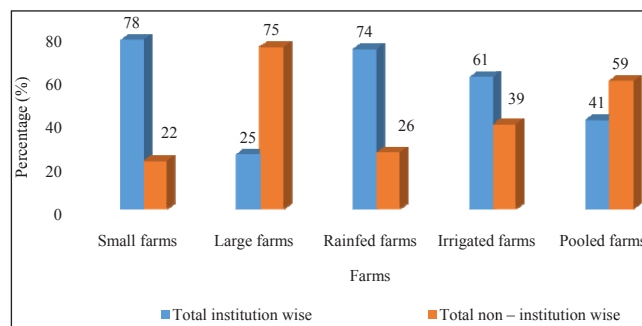


Fig. 4: Sources of borrowed funds for farm capital formation in less progressive area (Institution wise and Non- Institution wise).

The percentage of major assets formed through borrowed funds in rainfed farmers were livestock (70 %) and perennials (80 %). In case of irrigated farmers, the percentage of assets formed through owned funds was on perennials (80 %), farm building (68 %) and farm machinery (68 %). Investment for purchase of agricultural land and improvements on land in progressive area by large and irrigated farmers through borrowed amount of ₹ 67807 and ₹ 112120 per ha, respectively.

In less progressive area (Table 4, Fig. 2), major percentage of investment by small farmers on farm machinery and implements through borrowed amount (72 %). Large farmers investment on irrigation structures was largely self-financed

(93%). In the case of rainfed farmers, 88 per cent of borrowed amount used for livestock investment followed by farm buildings (84 %). Irrigated farmers used their 86 per cent of owned amount for livestock followed by purchase of land (79 %). Though, irrigated farmers borrowed money from various sources for capital formation, only in the case of a farm machinery and equipment higher amount of borrowed funds was incurred to the tune of ₹ 86387 per ha (67 %) followed by irrigation structure and equipment (₹ 92905 per ha; 56 %) (Venkataramana, 2010).

The institutional and non-institutional sources of borrowed funds for agricultural capital formation in progressive area and less progressive area

were presented in Fig. 3 and 4, respectively. In progressive area, of the total borrowed funds in pooled farms, the major share was from institutional (57 %). Among the farms, rainfed farms borrowed more from non-institutional sources (80 %) than the irrigated farms (40 %). In the case of small and large farms, percentage of investment from institutional sources (63 % and 54 %) were high than the non-institutional sources of funds (37 % and 46 %). In less progressive area, of the total borrowed funds in pooled farms, the major share was from non-institutional (59 %). Rainfed farms in contrast to progressive area, percentage of investment from institutional sources (74 %) was more and in the case of small farmers 78 per cent investment from institutional sources. In contrast to progressive area, in less progressive, the percentage of large farmers borrowed amount from non-institutional sources (75 %) was impressively high.

CONCLUSION

The farm level capital formation was higher in progressive area especially on irrigation structures and equipment's among all type of farmers except rainfed farmers (Livestock). In less progressive area, major investment on farm machinery and implements among all type of farmers except rainfed farmers (livestock). No doubt investment priority among small and rainfed farmers was on livestock, for supplementing year round incomes. Therefore, focus on irrigation development in rainfed farmers through micro irrigation and encouraged to take up of dry land horticulture crops. In small and rainfed farmers, investment on farm mechanization is lower in both areas, because of credit constraints, therefore make avail of financial support from institutions for investment purpose through government subsidies and need to promote the custom hiring centres (CHCs) to ensure the profitability of the same. The major farm assets (farm machinery, irrigation structures, livestock and perennials) formed at farm level through borrowed funds among small and rainfed farmers in both areas and vice versa in large and irrigated farmers (Self-financed). Out of borrowed funds in progressive area, institution source of funds played a major role than the non-institutional source of funds and vice versa in less progressive area.

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