

Agriculture Credit in Developing Economies: A Review of Relevant Literature

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Abstract

This paper aims to present a comprehensive review of 110 studies on agriculture credit in developing countries during 1995 to 2015. The literature has been classified and presented on the basis of time period, country of study, methodology used, issues covered, and sources of study. Agriculture credit has gained interest of policy makers and researchers in developing economies in recent years with raising concerns of issues like food security and rising population. However, the situation of small and marginal farmers is still vulnerable and they lack timely and adequate access to institutional sources of finance. Non-institutional sources of credit are still dominant in rural credit markets; while the role of micro-finance appears dubious. This study will prove helpful for policy makers and future researchers who wish to study diverse issues in rural finance in general and agriculture credit in particular.

Keywords: agriculture credit, repayment issues, credit rationing, agricultural productivity, development

1. Introduction

Agriculture is an essential economic sector of all world economies- be it developed, developing or under-developed, but it is the most important sector of a developing economy in terms of output and employment generation as compared to other sectors. (Soubotina & Sheram, 2000). Agriculture plays a predominant role in economic development of developing economies. Developing economy is one such economy which is characterized by the presence of both rural and urban sectors and is heavily dependent on agriculture (Mylott, 2009; Fan et al., 2005). The agriculture sector not only fosters the growth process of these economies but also provides food to their ever-growing population and provides employment to larger parts of their workforce. It is the backbone of an economy which supports rest other sectors. While the manufacturing sector needs direct input from agriculture in form of raw material, service sector is indirectly dependent on agriculture. Agriculture sector is crucial for both rural and urban sectors of an economy as it generates employment opportunities in the former and provides food and raw material to the latter. Besides its crucial importance in the overall development process, farmers in developing countries are to a large extent constrained by credit. The non-availability of adequate credit when needed negatively impacts the farm output (Guiringer & Boucher, 2008; Feder et al., 1990). The exclusion of masses from basic services of a financial system leads to significant loss in gross domestic product (GDP) of a country (Chattopadhyay, 2011). As the agriculture sector in such economies is dominated by small and marginal farmers, governments play an active role and initiate several policy measures time-to-time to improve situation of such farmers (Khandker & Koolwal, 2015). Still the majority of these farmers lack the timely access to institutional credit in adequate amounts needed in the production process.

Therefore, it becomes necessary to study the constraints which hinder the outreach of institutional credit to such vulnerable groups. Since the problems of farmers in developed countries are different from those in developing countries (Jansson et al., 2013) and given the crucial importance of agriculture sector in developing economies, this study has reviewed relevant literature on agriculture credit in emerging and developing economies. Further, the countries are categorized as “emerging and developing economies” by International Monetary Fund’s (IMF) “World Economic Outlook Report 2015”.

2. The Conceptual Framework

Agriculture sector is a major contributor of GDP of agriculture-based economies as compared to other sectors of the economy and is a primary source of livelihood for more than half of their total workforce (Mondiale, 2008).

Credit is needed as an important indirect input among others to enhance productivity in agriculture (Sriram, 2007; Das et al., 2009). With modernization and mechanization of farming systems, farming communities require more farm investment. Since most of the farmers in developing countries are small and marginal with fragmented land holdings, they need credit for such investment. Due to lower rate of savings in these economies, the farmers lack sufficient owned-equity and hence resort to external borrowings (Chisasa & Makina, 2012).

Most of the farming households are faced with paucity of funds at their end. To fulfill their credit requirements, both institutional and non-institutional of finance are available in a developing economy (Singh et al., 2001). When credit is not available on time and at reasonable rates from institutional (formal) sources, farmers are forced to pay exorbitant rates of interest to non-institutional (informal) lenders (Reddy, 2012; Chaudhuri & Gupta, 1996). Traditionally when agriculture was mainly subsistence based, informal moneylenders used to cater to credit needs of farmers which were comparatively small. After the Green Revolution across the world which initiated tremendous changes in the cropping pattern, the credit needs of farmers have increased spontaneously; and it was during this period that institutional sources of credit emerged as major players. This was the era when subsistence cropping was replaced by cash cropping. Later on, micro-finance emerged as an effective tool of providing credit to the rural communities (Pradhan, 2013). Figure 1 shows the principal sources of credit available to farming communities of an economy. Credit from institutional sources include credit from setup of institutional framework with Apex bank of the country at the top and institutions covered under its purview including specific bodies established for agricultural development of the nation, commercial banks, co-operative banks, regional rural institutions, whereas the non-institutional sources cover credit from unorganized sector like friends, relatives, big landlords, contractors which are not part of the institutional setup. In the mid-way of institutional and non-institutional agencies, lies the semi-formal setup of micro-finance - the provision of a range of financial and non-financial services to group members based on joint liability. While the financial services of micro-finance institutions (MFI) include providing loans (generally in small amounts) to group members, insurance cover, provision of savings; the non-financial services include training and self-employment programs at an affordable cost (Morduch, 1999).

Figure 2 highlights the components covered under the scope of institutional credit. While the direct credit includes all short medium and long term loans for agriculture and allied activities to farmers with direct responsibility of repayment to the lending agency, indirect credit on the other hand includes indirect farmer benefits through subsidized farm inputs. In case of indirect credit, the farmers are under indirect repayment responsibility to the lending agency through fertilizer dealers, corporations, input supplier.

Despite its crucial importance and efforts by government, there exists shortage of agriculture credit in relation to its demand by farming communities. This unmet demand paves way for indigenous lenders as a source of finance for farmers. In this regard, this paper is an attempt to present the financing problems/constraints of farmers in developing economies as reported in literature. A comprehensive review of agricultural credit in various developing economies in the world has been presented covering a time span of twenty years during 1995 to 2015. Published and unpublished literature has been surveyed to analyze determinants, status and performance, determinants of agriculture credit in various countries included in the study.

3. Rationale and Scope of the Study

In the recent years, there has been a growing concern about farmer distress, productivity in the agriculture sector amidst rising concerns over food security and sustainability in agriculture. Besides the crucial importance and significant contribution of agriculture in overall GDP of agriculture-based developing economies, the situation of farmers especially the small and marginal ones is still vulnerable. Farmer distress and suicides are very common in countries particularly India and China. Both natural and manmade factors are responsible for such acts. The natural factors include loss of income due to natural calamities of flood, drought, crop failure due to prevalence of pests and diseases etc. which are not in control of mankind; whereas manmade factors can be controlled to an extent and include factors like burden of debt, low return for production due to inefficient marketing and unavailability of resources, higher cost of production due to use of outdated technologies in the production process. Besides considerable efforts and interference by the respective governments, the non-institutional sources of credit have deep roots in the rural credit markets of such economies thereby jeopardizing the prevalence and growth of institutional sources of credit. Several welfare schemes initiated by the governments like loan waiver schemes during crop failure, agricultural crop insurance etc. are not available to vulnerable

groups including small and marginal farmers which actually need it thereby making their situation miserable. The exclusion of several vulnerable groups from the formal financial services may lead to their social exclusion in the long-run. The provision of timely access to adequate credit may not only help to uplift the situation and living standards of the farming communities but may also raise the production levels in an economy thereby accelerating its GDP growth and hence sustainable development in the long run. The question of whether it is a matter of choice or compulsion to use non-institutional sources of finance is still vague. In light of the above, this paper is an attempt to analyze and present various issues pertaining to agriculture credit at a single place. Relevant literature has been reviewed, classified and presented based on several themes. Literature on the following issues pertaining to agriculture credit has been presented and analyzed in this study –determinants of source and quantum of agriculture credit, gender issues, status, performance and current issues in agriculture credit, impact of agriculture credit on productivity, rationing in rural credit markets, repayment issues in agriculture credit, impact of reforms on agricultural credit and emergence of alternative sources of finance in agriculture.

4. Objectives of the Study

The broad objective of this paper is to present the studies on agriculture credit in an organized and easily interpretable way by systematically arranging various published and unpublished studies. The idea is to segregate the reviewed studies into suitable categories based on year, focus area, source of publication, country of study and analyze them accordingly. This paper can serve help for future researchers, policy makers by presenting several inter-related aspects related to agriculture credit at one place. Studies related to issues of determinants of agriculture credit, rationing in credit markets, repayment issues and certain related issues have been analyzed. In particular, this study may help policy makers/bankers/lending institutions of the country on which they are based in taking balanced review of status and performance of agriculture credit. A total of 110 studies published across the world on developing economies have been reviewed for the period 1995 to 2015. The paper also suggests the future prospects for research in agriculture credit markets of these developing nations.

5. Break-Up of Literature on Agriculture Credit

After carefully examining all 110 papers, the next step was to classify the literature into suitable categories with internal homogeneity within each category. A comprehensive snapshot of all the reviewed studies is given at end of the paper (Table A1). All analysis, tables and figures of this paper are based on Table A1. On the basis of review, the literature has been classified according to the following themes:

- (1) Year-wise classification of studies;
- (2) Region-wise classification of studies;
- (3) Country-wise classification of studies;
- (4) Source-wise classification of studies;
- (5) Classification based on type of research.

5.1 Year-Wise Classification of Studies

Table I gives the year wise classification of reviewed studies for the period 1995 to 2015. Figure 3 is a graphical presentation of year-wise publication of reviewed studies. A glance at this figure shows that more papers have been reviewed from recent years thereby indicating the increased importance gained by agriculture sector in more recent years. The maximum no. of reviewed studies is for the year 2012 (19), followed by the year 2013 (16) and 2014 (14) (figures in parenthesis show the no. of studies reviewed during that particular year). It can be noticed that the number of studies have been increasing particularly after the year 2006. In the Indian context, it was the period when its government attempted major efforts to promote financial inclusion in the country.

5.2 Region-Wise Classification of Studies

The reviewed studies have been further classified on the basis of geographic region of the world to which a particular country of study belongs. The maximum number of reviewed studies is from East Asia (6), followed by South Asia (4) and East Africa (4) (figures in parenthesis show the number of studies reviewed for the respective region). In East and South Asia regions, majority of the population is dependent on agriculture and therefore a lot of research has been done on agriculture sector of these regions.

5.3 Country-Wise Classification of Studies

We have further classified the literature on agricultural credit on the basis of country on which the study is based.

Table II shows the list of countries on which the reviewed studies are primarily based. A good number of researches have been carried out in various parts of the world. India tops the list with 36 studies, followed by Nigeria (20), Pakistan (09) and so on (figures in parenthesis represent the number of studies in that particular country). Figure 5 shows the country wise publications of the reviewed studies. It can be observed that agriculture sector in developing countries is gaining a reasonably good attention of researchers.

5.4 Sources of Publication

Table III gives a comprehensive snapshot of distribution of various sources of publication from where the studies have been retrieved. The most frequent sources of publication are Agricultural Economics Research Review (9); followed by Journal of Development Economics (6), Economic and Political Weekly (5) and so on (figures in parenthesis represent the number of publications in respective journal). A variety of journals have published research in agriculture as the agriculture sector is related to several other sectors of the economy and it affects and gets affected by changes in these sectors.

5.5 Classification Based on Type of Research

Here the reviewed literature has been classified on the basis of methodologies adopted in research. For this purpose, the literature has been classified into four categories namely-conceptual, descriptive, empirical and exploratory cross sectional studies. Conceptual studies are those which cover the basic and fundamental concepts of functioning (in rural markets). Descriptive studies give explanation and description of status, content/process and performance issues. Empirical studies cover data from existing sources to estimate and evaluate relationships among various variables. Studies based on primary data collected through surveys are defined as exploratory cross sectional. Table IV gives the distribution of studies according to type of research. Figure 6 shows the percentage distribution of the same. Most frequent methodology used in the literature is exploratory cross sectional (61), followed by empirical (22) (figure in parenthesis represent the number of studies employing a particular methodology).

6. Focus Area of Research

This section of paper presents the break-up of literature on the basis of the focus area of research on agriculture credit. Table V represents focus areas of the reviewed studies. Identifying determinants of agricultural credit is the focal point of most of the studies. Notations “a-i” show the bifurcation of focus area in literature. “a” represents the determinants of sources and amount of agricultural credit, “b” denotes gender issues in agricultural credit, “c” depicts the status, and performance of agriculture credit in developing nations, “d” shows the impact of agriculture credit on output and productivity, “e” represents studies which focus on rationing of rural credit markets, “f” represents studies related to repayment issues in agricultural credit, “g” shows studies focusing on the role of Islamic Banking in agriculture credit, “h” depicts studies on agriculture credit via micro finance institutions, “i” represents studies which focus on the performance of agriculture credit in developing countries during pre and post reform periods. Figure 7 depicts the percentage distribution of focus area of reviewed studies.

6.1 Determinants of Agricultural Credit

Several researchers in the past have tried to identify the factors which significantly influence the household’s decision for choice of a particular source of agricultural credit (Akpan et al., 2013; Salami & Arawomo, 2013; Yuan et al., 2011). Several variables (factors) have been used in the literature by eminent researchers to analyze their impact on farmer household’s decision.

6.1.1 Factors Affecting Quantum and Source of Agricultural Credit

On the basis of observation of reviewed studies, we found a variety of factors which have significant impact on a household’s decision to opt for a particular source of credit. On the basis of review, these factors were classified into three categories based on common attributes as depicted in Table VI. The most common individual specific factors include caste, education, marital status of the household, contact with extension agents, years of experience in farming, land size, gender, contact with large landholders etc. (Aliero & Ibrahim, 2011; Dzadze et al., 2012; Sebopetji & Belete, 2009; Akudugu, 2012; Akpan et al., 2013).

6.1.2 Techniques Used to Identify Determinants of Agriculture Credit

Different researchers used various techniques to identify the determinants of access to different sources of agricultural credit. Table VII gives a brief view on techniques used in the literature. A large number of researchers used logistic regression to determine the impact of various socio-economic variables on the access to credit (Chauke et al., 2013; Ololade & Olagunju, 2013; Hananu et al., 2015). Logistic regression model can be

classified into the following:

- (1) Binary logit model;
- (2) Multinomial logit model;
- (3) Ordered logit model.

While binary logit model is applied where the outcome has binary outcome (either 0 or 1), multinomial logit regression is applied where the outcome has more than two categories (Mpuga, 2010). Here the choice of reference category is arbitrary and this can be used as base category to facilitate comparison between “N” numbers of groups. While ordered logit model is used where the dependent variable has more than two outcomes (categories) having sequential order (Nouman et al., 2013). The outcome i.e. odds ratio gives the magnitude of change in dependent variable for changes in various independent variables (Kosgey, 2013; Baiyegunhi & Fraser, 2014).

Probit modeling has also been used by a fairly good number of studies to model the probabilities of access to a particular source of finance (Sen & Prajapati, 2013; Datta & Ghosh, 2013; Seboptji & Belete, 2009). Both logit and probit models have been used in the literature. These are specific cases of modeling when the dependent variables cannot be measured on a metric scale rather it is categorical in nature (Bhanot et al., 2012). Pal and Laha (2014) used quantile regression along with Ordinary least squares method to get an estimate of total credit across various conditional quantiles of borrower groups.

6.2 Gender Issues in Agriculture Credit

Studies have investigated the impact of gender on the quantum and sources of agriculture credit. The formal credit was found to be biased against women. The factors affecting the choice of source of finance are different for males and females (Jeiyol et al., 2013; Akugudu et al., 2009). Goetz and Gupta (1996) assert that self-financed institutions in rural areas are more concerned about the quantitative aspects of granting credit to women, while the qualitative aspects like use of credit are not taken care of. Kabeer (2001) documents that loans directed to women have more chances of improving their personal and social benefits. Women are biased than men in terms of access to credit and such inequality is the most insidious form of inequalities (Schuler et al., 1996; Ogunlela & Mukhtar, 2009).

6.3 Impact of Agriculture Credit on Output and Productivity

Literature seems to be divided on the issue of the impact of agriculture credit on agricultural output. On reviewing the literature, it was concluded that the studies can be segregated into two categories:

- (1) Agriculture credit has positive and significant impact on agricultural output; and
- (2) Impact of agriculture credit on agricultural output cannot be directly established;

While some studies in literature find the direct and significant impact of agriculture credit on output (Bashir et al., 2010; Iqbal et al., 2003; Saleem & Jan, 2011; Rima, 2014; Villanueva, 2014; Ekwere & Edem, 2014), some others hold that the impact of agricultural credit on farm output cannot be directly established (Sriram, 2007; Hussain, 2012; Zuberi, 1989; Sjah et al., 2003). Ahmad (2011) and Raza and Siddiqui (2014) insist that it is indirect credit to agriculture which has significant impact on agricultural output and not direct credit. De rosary et al. (2014) used simultaneous equation modeling to see the impact of credit on economic functions like production, consumption and investment of households. Duy (2012) applied stochastic frontier analysis and quintile regression and found positive impact of institutional and non-institutional credit on farm output and production efficiency. Similarly, Xi and Li (2007) used quintile regression to see the impact of formal and informal credit on income and efficiency. Binam et al. (2004) estimated technical efficiency of various categories of farmers and found that efficiency differences are significantly influenced by the amount of agricultural credit utilized in production. Technical efficiency of farmers includes factors like flow of information, access to better infrastructure facilities, farmer's expertise in management of resources and availability of required funds (Iqbal et al., 2003; Chisasa & Makina, 2013). Obilor (2013) applied regression analysis and found that credit allocation to agriculture had significant positive result on productivity. Dong et al. (2010) used probit modeling to determine the relationship between various socio-economic variables and credit condition of households and found that agricultural productivity can be improved with increased use of credit. Owuor and Shem (2012) used switching regression model which is estimated by employing Heckman sample correction method and found significant impact of agriculture credit on production and various input use.

A large number of studies have employed co integration to see the causality between agriculture credit and output. While some findings suggest positive significant impact of agricultural credit on output (Ammani, 2012;

Okulegu et al., 2014; Ihugba et al., 2013), some other studies reject this hypotheses (Oyakhilomen et al., 2012; Musuna & Muchapondwa, 2008). Table VIII shows the distribution of studies used in the literature to analyze the impact of agricultural credit on farm output. In the literature, Cobb-Douglas production function has been widely used, followed by Granger causality and Co integration. The other approaches include correlation, probit modeling and mixed approaches.

Researchers also employed stochastic frontier analysis to see the impact of agricultural credit on productivity (Liu, 2006; Dolisca & Jolly, 2008; Nisrane et al., 2011; Kebede, 2001; Chiona et al., 2014). Several studies have used Cobb-Douglas production function to see the impact of agricultural credit on productivity (Sriram, 2007; Bashir et al., 2010; Iqbal et al., 2003; Saleem & Jan, 2011, Rima, 2014). It is a production function which represents the relationship between output and a number of input variables (Chisasa & Makina, 2013). To see the impact of credit or other variables, it is log-transformed to take the following form:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 \dots \beta_n \ln X_n + \epsilon_t \quad (1)$$

Here $\ln Y$ represents the log of agricultural output, β_0 represents constant term, β_1 to β_n are beta coefficients presenting partial elasticity of various explanatory variables, ϵ_t represent random error term. Figure 8 shows the most common input variables used to determine their impact on output. Sial et al. (2011) and Iqbal et al. (2003) used dummy variable along with others to see the impact of various uncertainties like drought or floods on agricultural output and found significant negative relation showing decrease in agricultural output during bad years.

6.4 Rationing in Credit Markets

Literature is full of evidences to show that well-functioning and efficient rural credit markets can promote rural household's income level and thereby reduce poverty by promoting equitable distribution of resources. Besides institutional setup of rural credit markets, a large number of non-institutional lenders are also present in rural credit markets. As credit from institutional sources is rationed in these countries, rural households are constrained by credit severely (Rui & Xi., 2010; Kochar, 1997; Carter, 1988). Credit rationing is a situation when those who need credit do not get it in adequate quantity (Jansson et al., 2013). A large number of studies have tried to determine the reasons why the credit markets are rationed (Hashi & Toci, 2010; Weber & Musshoff, 2012; Jaffee & Stiglitz, 1990; Petrick, 2005).

The question that "is it choice or necessity" to resort to non-institutional sector has been addressed by several authors differently. Chaudhuri and Gupta (1996) assert that market for informal loans is created due to delay in disbursing formal loans and that the effective interest on loan from formal sector is same due to incorporation of bribe amount in formal credit which is paid by farmers to avoid delay. Beaman et al. (2014) find that large landholders who have higher returns to their investment choose their source of finance independently since institutional and non-institutional lenders both are ready to lend money to them. Kochar (1997) finds that the extent of rationing is much lesser than what it has been assumed to be and that credit supplied to rural households is less because it is not much demanded. Basu (1997) asserts that credit by formal sources is rationed due to the inherent risk present in agriculture and allied activities, thereby reducing the probability of earnings. Further it is the "congruence of interest" between landlord and tenants which gives birth to loan agreement. Bose (1998) argues that when moneylenders are not fully aware of the likelihood of default by various classes of borrowers, the provision of subsidized credit by banks can lead to adverse "composition effects" which deteriorate the availability of loans in unorganized sector. Guirking (2008) found that it is not rationing by formal sector rather lower transaction costs which drive rural households to informal sector. Such lower costs are enjoyed by informal lenders due to proximity and economies of scope.

Credit rationing has deep roots in agriculture sector as compared to other sectors of an economy (Weber & Musshoff, 2012). Rationing of credit causes a significant loss in income levels and consumption expenditure of rural households (Li et al., 2013). Stiglitz and Weiss (1981) explain credit rationing in terms of agency issues:

- (1) adverse selection;
- (2) moral hazard.

Adverse selection occurs in rural credit markets when the formal credit institutions are not fully aware of borrower's credit worthiness and therefore credit worthy borrowers are left when banks try to mitigate the risk of default by raising the rate of interest (Klonner & Rai, 2005; Binswanger & Deininger, 1997; Ghosh et al., 2000). While moral hazard occurs as a result of dominance of large and wealthy landholders while obtaining cheap credit since they possess more resources to offer as collateral and as a result the poor borrowers are left away (Simtowe et al., 2006). Figure 9 has diagrammatically presented the agency problem.

6.5 Repayment Issues in Agriculture Credit

Apart from rationing in credit markets, studies have also tried to analyze repayment issues in agriculture credit. Banks do not lend to poor groups due to fear of non-repayment and increase in their non-performing assets. A large number of studies have tried to investigate various factors which affect repayment performance of borrowers in rural markets. Kohansal and Mansoori (2009) applied logit regression to identify factors influencing repayment and found that farming experience, income of borrower, loan size, value of collateral offered as security have significant positive impact on repayment performance of borrowers while interest rate, total application costs and number of installments to repay loan impact it negatively. Figure 10 shows the classification of factors affecting repayment schedules. Various factors affect repayment performance of borrowers in the rural credit markets. We have classified these factors into two broad categories, namely:

- (1) Social factors;
- (2) Economic factors and;
- (3) Contract-specific factors.

While the most common social factors affecting repayment rate among borrower households are age, education, gender, marital status, experience of the household, household size, diversion of loan due to family commitments, incidence of crop diseases and pests, farm size, monopoly power created by informal lenders in markets, use of modern machinery and equipments, contact with extension agents, social relations of the borrower households.

Economic factors include interest rate on loan, income of the household, loan size, value of the collateral offered as security, total application costs, off-farm income, net profit, market price fluctuations, market value of livestock, fluctuations in commodity prices, amount spent on hiring equipment (Kohansal & Mansoori, 2009; Weber et al., 2014).

Contract-specific factors include various terms and conditions specific to a particular loan contract like lender's supervision on utilization of loan, number of repayment installments, down-payment of loan, length of waiting time for receiving the loaned amount from lender, length of repayment period.

7. Policy Issues and Implications

In line with the objective of presenting and classifying the reviewed studies, several issues relating to agriculture credit in developing countries have been discussed. The review presented in this study can be used by policy makers/banks/researchers to judge the performance of agriculture credit in these nations and analyze the situation of agriculture sector in this direction. A review of the relevant literature highlights that the interest of researchers has been growing towards this topic over the past few years. However, there exist huge disparities in the number of publications in these countries. Determining the factors which affect household's choice of a particular source of finance has been heavily emphasized by eminent researchers in the literature. Several factors have been used to study this relationship at the micro-level, the most prominent of which are- literacy, land size, marital status, distance from a lending institution, age of the borrower, caste, religion, the value of assets owned by the household. A majority of studies have reported significant impact of literacy, size of landholdings and household assets on opting for the source of financing agriculture. Their findings reassert the importance of literacy especially financial literacy in covering the hitherto deprived groups under the ambit of institutional setup of an economy and in uplifting their living standards. Household assets and size of landholdings represent the value which the households possess and can offer as collateral security while procuring loan. As banks perceive clients with more asset value as credit-worthy, they are more inclined towards such borrowers than their other counterparts. Therefore, it is important for the governments and other regulatory authorities to keep a regular and timely check on lending activities of financial institutions covered under their ambit and to encourage banks for social banking initiatives rather than class banking. In the development process of an economy, it is important to implement policies at the bottom level rather than at the top only. Next, the impact of direct institutional credit is found to be associated with the productivity levels by majority of studies which pinpoints the discrepancies in indirect credit mechanism. The failure of cooperative banking in India is one such example. Banking institutions in an economy should be promoted in such a way that they are sustainable in the long-run and their dependence on donors/state governments is minimal. Micro-finance and Islamic Banking appear to be alternate source of financing agriculture and find the mid-way of institutional and non-institutional setup of rural market markets. But micro-finance institutions are perhaps in their nascent stage and their management needs to be nurtured. Lack of awareness among masses about their working and lack of trust pose restrictions on their financial and operational sustainability in the long-run.

8. Conclusions and Way to Future Research

This study has reviewed 110 research papers on agriculture credit between 1995 and 2015 from various journals, working papers and several other published and unpublished sources. Studies on developing countries relating to agriculture credit have been systematically presented and reviewed. Agriculture credit is a topic of considerable interest in countries particularly India, Nigeria and Pakistan. After reviewing the studies, a noticeable growth in the number of studies have been observed particularly after the year 2006. The agriculture sector has assumed more importance in recent years amid rising concerns about food security and population pressures. In the Indian context, this was the period when government focused extensively on the increased use of institutional credit and several measures policy measures were initiated to promote financial inclusion. Majority of the studies are focused on determinants of sources and amount of agriculture credit by employing exploratory cross-sectional research. However, less research has been done on identifying the supply side determinants/constraints of agriculture credit. This could be an area of future research. So far, the implementation of policies framed by the government has lacked the desirable commitment from banks/financial institutions which are in close proximity with farmers. It appears that in order to make the credit delivery system inclusive, efforts need to be initiated at the bottom level rather than at top. Further, this study is limited to developing countries only, therefore future research can be undertaken by including developed nations which remain uncovered in this study. Studies by Duy (2012), Liu (2006) applied stochastic frontier analysis to analyze the impact of agriculture credit on farm output and production efficiency. Application of stochastic frontier analysis in agriculture output is paving a new way for future research. To analyze the level of integration between credit and output, new techniques like Auto regressive distributed lags (ARDL) can be applied in future research. Micro-finance institutions appear to be a good option which can fulfill the gap for institutional credit but micro-finance institutions themselves are faced with internal conflicts of interest and discrimination and paucity of funds at their end. Literature seems less focused on reporting such discrepancies and how MFIs can be made sustainable. The policy implications and impact of microfinance on agricultural production and household income can be studied further.

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Table 1. Year-wise classification of reviewed studies

| Sr. No. | Year | No. of publication |
|---------|------|--------------------|
| 1 | 1995 | 01 |
| 2 | 1996 | 01 |
| 3 | 1997 | 02 |
| 4 | 1998 | 01 |
| 5 | 1999 | 02 |
| 6 | 2000 | 01 |
| 7 | 2001 | 03 |
| 8 | 2002 | 01 |
| 9 | 2003 | 03 |
| 10 | 2004 | 02 |
| 11 | 2005 | 02 |
| 12 | 2006 | 01 |
| 13 | 2007 | 04 |
| 14 | 2008 | 06 |
| 15 | 2009 | 08 |
| 16 | 2010 | 09 |
| 17 | 2011 | 12 |
| 18 | 2012 | 19 |
| 19 | 2013 | 16 |
| 20 | 2014 | 14 |
| 21 | 2015 | 02 |
| Total | | 110 |
| Maximum | | 16 |
| Minimum | | 01 |

Source: Based on author's own calculation of reviewed studies.

Table 2. Country-wise classification of studies

| Country | No. of Publications | Percentage |
|---------------|---------------------|------------|
| India | 36 | 33 |
| Nigeria | 20 | 18 |
| Pakistan | 09 | 08 |
| China | 05 | 05 |
| Ghana | 05 | 05 |
| Cross country | 05 | 05 |
| South Africa | 04 | 04 |
| Vietnam | 03 | 03 |
| Others | 23 | 21 |

Note. Others include Indonesia, Ethiopia, Uganda, Iran, Malawi, Thailand, Algeria, Kenya, Peru, Mali, Mexico, Malaysia, Madagascar, Philippines, Cameroon, Yemen, Barbados and Nepal.

Source: Based on author's calculation of reviewed studies given in Table A.

Table 3. Classification of studies based on source of publication

| Particulars | No. of papers |
|---|---------------|
| Agricultural Economics Research Review | 9 |
| Journal of Development Economics | 6 |
| Economic and Political Weekly | 5 |
| African Journal of Agricultural Research | 3 |
| SSRN | 3 |
| The Journal of Rural and Agricultural Research | 3 |
| Journal of Social Sciences | 2 |
| China Economic Review | 2 |
| International Journal of Current Research and Academic Review | 2 |
| Sarhad Journal of Agriculture | 2 |
| World Development | 2 |
| Food Policy | 2 |
| Bulletin of Agricultural and Fisheries Economics | 1 |
| Agricultural and Food Economics | 1 |
| Bangladesh e-Journal of Sociology | 1 |
| Food security | 1 |
| Journal of Development and Agricultural Economics | 1 |
| The Journal of Development Studies | 1 |
| International Journal of Food and Agricultural Economics | 1 |
| Theoretical and Applied Economics | 1 |
| Journal of Sustainable Development in Africa | 1 |
| Greener Journal of Agricultural Sciences | 1 |
| Applied Economics | 1 |
| Journal of Agricultural Sciences | 1 |
| African Development Review | 1 |
| American Journal of Experimental Agriculture | 1 |
| MPRA | 1 |
| International Journal of Learning and Development | 1 |
| Journal of Agriculture and Social Sciences | 1 |
| International Journal of Business, Humanities and Technology | 1 |
| European Journal of Business and Management | 1 |
| International Business and Economics Research Journal | 1 |
| International Journal of Scientific and Research Publications | 1 |
| Journal of Management and Information Technology | 1 |
| International Journal of Rural Management | 1 |
| Journal of Rural Development | 1 |
| Asian Journal of Agriculture and Rural Development | 1 |
| Journal of Economic Behavior and Organization | 1 |
| Global Journal of Applied Management and Social Sciences | 1 |
| International Journal of Economics and Finance | 1 |
| American International Journal of Social Science | 1 |
| Journal of Agriculture, Biotechnology and Ecology | 1 |
| Journal of Biology, Agriculture and Healthcare | 1 |
| Agricultural Journal | 1 |
| International Journal of Agriculture and Forestry | 1 |
| The Pakistan Development Review | 1 |
| Agricultural Finance Review | 1 |
| Research Journal of Finance and Accounting | 1 |
| The Journal of Finance | 1 |
| International Journal of Management and Social Sciences Research | 1 |
| Asian Social Science | 1 |
| International Business and Economics Research Journal | 1 |
| Journal of Agriculture and Rural Development in the Tropics and Subtropics | 1 |
| Agricultural Economics | 1 |
| Global Journal of Science Frontier Research | 1 |
| Pakistan Journal of Agricultural Sciences | 1 |
| Journal of Environmental Science, Computer Science and Engineering and Technology | 1 |
| Scholars Journal of Arts, Humanities and Social Sciences | 1 |
| Agris on-line Papers in Economics and Informatics | 1 |
| Conference papers | 7 |
| Working papers and others ^a | 16 |
| Total | 110 |

Note. ^aothers include working papers, thesis, various reports and surveys available on internet web sites

Source: Based on Table A1.

Table 4. Distribution of studies based on type of research

| Methodology | No. of papers | Percentage |
|-----------------------------|---------------|------------|
| Exploratory cross sectional | 61 | 56 |
| Empirical | 22 | 20 |
| Descriptive | 19 | 17 |
| Conceptual | 08 | 07 |
| Total | 110 | |

Source: Based on Table A1.

Table 5. Focus area of literature

| Focus area | No. of papers | Percentage |
|---|---------------|------------|
| (a) determinants of sources and amount of agricultural credit | 26 | 24 |
| (b) gender issues in agriculture credit | 04 | 04 |
| (c) status and performance of agricultural credit | 24 | 22 |
| (d) impact of credit on productivity and development | 23 | 21 |
| (e) rationing in credit markets | 12 | 11 |
| (f) repayment issues in agricultural credit | 08 | 07 |
| (g) role of micro-finance in agricultural credit | 06 | 05 |
| (h) agricultural credit pre and post reforms | 05 | 05 |
| (i) credit via Islamic banking | 02 | 02 |
| Total | 110 | |

Source: Based on author's own calculation based on studies reviewed.

Table 6. Classification based on determinants of agriculture credit

| Type of classification | Variables used |
|------------------------|--|
| Individual factors | Education, marital status, caste, gender, extension contact, experience, age, size of household, social status, affiliation to political party, membership of farmer's association |
| Economic factors | Income level, collateral value, rate of interest, transaction cost, total cost of production, land size, incidence of past savings, participation in off-farm activities, value of livestock, healthcare expenditure, expenses on child education, repayment capacity, net margins |
| Others | Irrigation facilities, access to basic infrastructure facilities, purpose and duration of loan, type of crop, distance from lending institution, status of land records |

Note. Based on exploratory cross-sectional studies only.

Source: Based on author's review of studies.

Table 7. Classification of studies according to techniques used

| Techniques used | No. of studies | Percentage |
|-----------------|----------------|------------|
| Logit Analysis | 10 | 38 |
| Probit Analysis | 05 | 19 |
| ANOVA | 02 | 08 |
| Regression | 04 | 15 |
| Others | 05 | 20 |

Note. Others include Tobit analysis, discriminant analysis, general linear model, ratio analysis, mixed approaches.

Source: Based on author's own calculation of reviewed studies.

Table 8. Distribution of studies based on methodology used to study impact of credit on output

| Approach used | No. of Studies | Percentage |
|--------------------------------------|----------------|------------|
| Cob-Douglas production function | 11 | 37 |
| Granger causality and co integration | 08 | 27 |
| Regression | 06 | 20 |
| Others* | 05 | 16 |

Note. others include probit modeling, simultaneous equation modeling and mixed approaches.

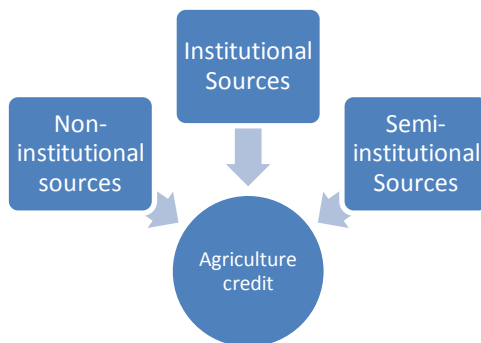


Figure 1. Sources of agriculture credit

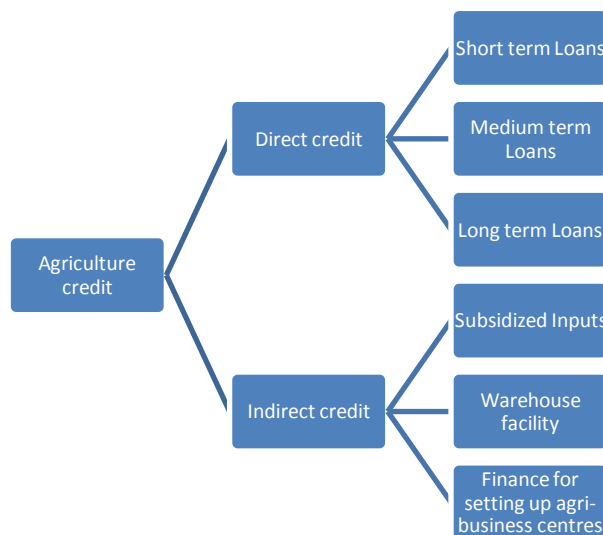


Figure 2. Components of direct and indirect agriculture credit

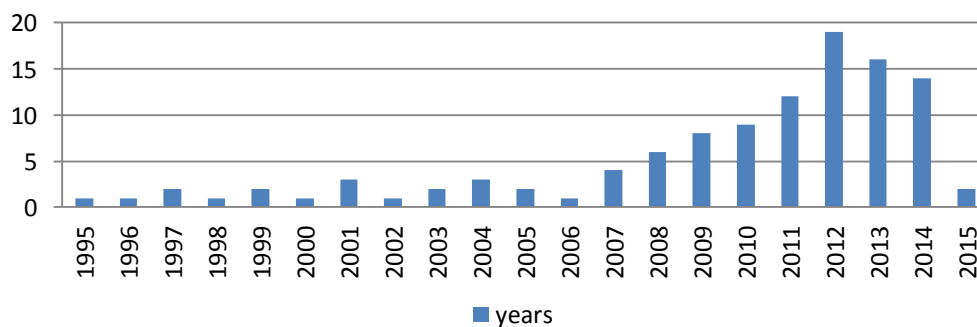


Figure 3. Year wise classification of reviewed studies

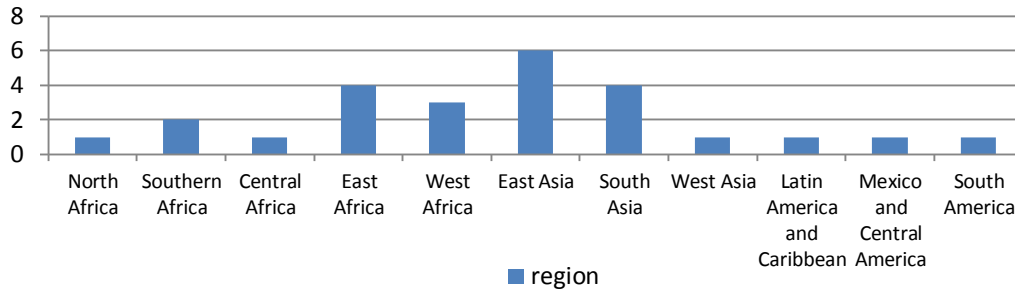


Figure 4. Region-wise classification of studies

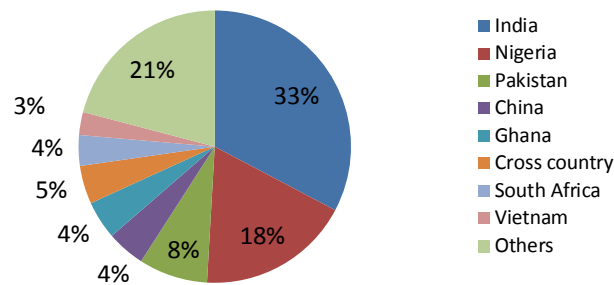


Figure 5. Country wise publication of studies

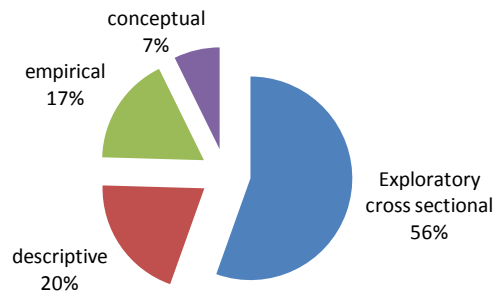


Figure 6. Distribution of studies based on type of research

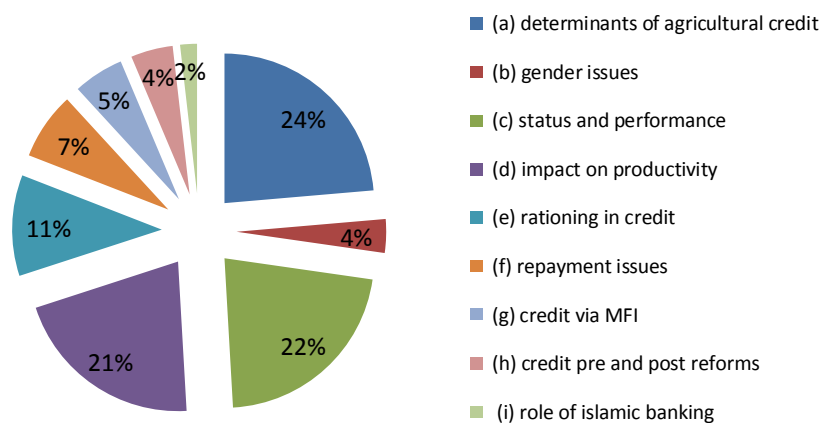


Figure 7. Focus area of literature

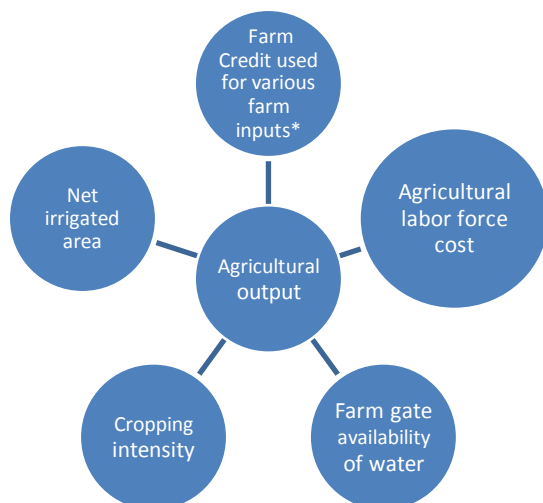


Figure 8. Classification of various input variables used in various production functions

Note 1. * means credit used for various inputs like seed, implementation of machinery and tube well, fertilizers, pesticides & fungicides, land preparation other costs.

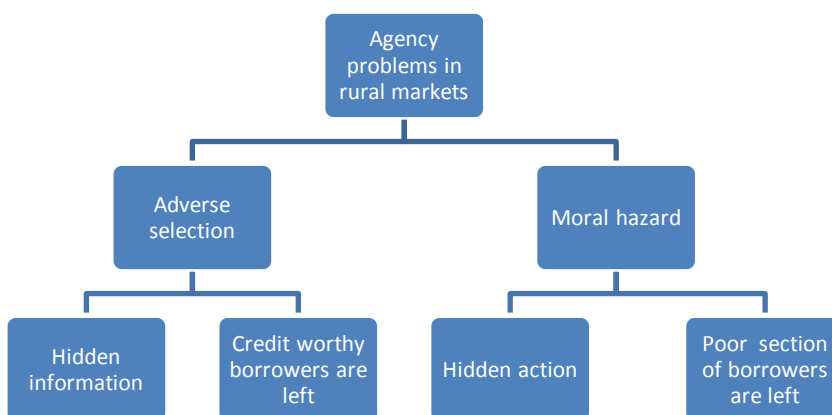


Figure 9. Agency problems in rural markets

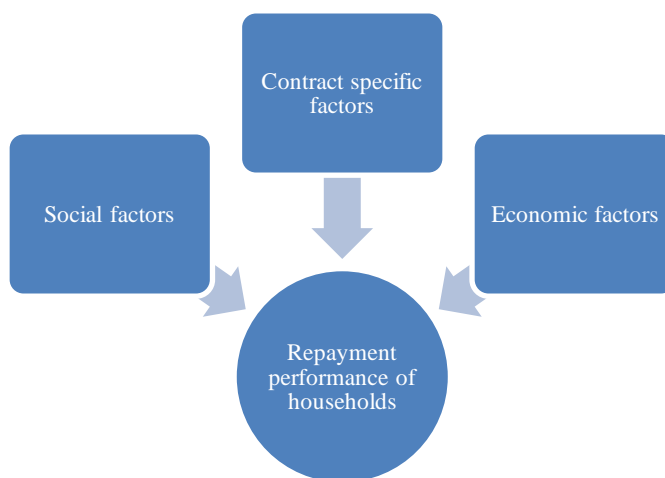


Figure 10. Factors affecting repayment performance of households

Table A1. Comprehensive snapshot of classification of 110 reviewed studies

| Sr. no.Author (year) | Focus area | methodology | findings |
|---|------------|--------------------------------|--|
| 1 Aliero & Ibrahim (2011) (Nigeria) | 1 | exploratory Cross sectional | Income level, collateral, education, marital status have significant positive impact on farmer's access to credit while rate of interest and transaction costs impact it negatively |
| 2 Datta & Ghosh (2013) (India) | 1 | Exploratory Cross sectional | Borrowers of formal sector have better access to electricity and irrigation facilities, belong to upper caste and have better access to infrastructure facilities |
| 3 Reddy (2012) (India) | 1 | exploratory Cross sectional | Borrowings from formal sector are for longer duration and for productive purposes. |
| 4 Gandhimathi & Vanitha (2010) (India) | 1 | exploratory | Cost of production and land size major factors in |
| 5 Pal & Laha (2014) (India) | 1 | Cross sectional exploratory | discriminating borrowers of cooperative and commercial banks Institutional credit skewed towards resource-rich households |
| 6 Hussain & Thapa (2012) (Pakistan) | 1 | exploratory Cross sectional | Lengthy process of loan sanctioning and arbitrary assessment of collateral value constraint access to institutional credit by smallholders |
| 7 Nouman et al. (2013) (Pakistan) | 1 | exploratory Cross sectional | Farm status, farm size, literacy level and marital status significantly affect amount of agricultural credit. |
| 8 Dzadze et al. (2012) (Ghana) | 1 | exploratory Cross sectional | access to agricultural credit is positively and significantly affected by level of education, extension contact and habit of saving. |
| 9 Bashiru et al. (2014) (Ghana) | 1 | exploratory Cross sectional | Average amount of credit availed by farmers is same across all sources of credit and that credit used for both productive and non-productive purposes in study area |
| 10 Sebopetji & Belete (2009) (South Africa) | 1 | exploratory Cross sectional | Years of experience, gender and marital status positively affect farmer household's decision to use credit while age, literacy level and farmer association's membership affect it negatively. |
| 11 Stampini & Davis (2008) (Vietnam) | 1 | empirical | Participation in non-farm labor activities relaxes credit constraints and increases spending on farm inputs. |
| 12 Admasu & Paul (2010) (Ethiopia) | 1 | exploratory Cross sectional | Working land size is crucial to decide quantum of input loan sanctioned by cooperatives. |
| 13 Ugbajah (2014) (Nigeria) | 1 | exploratory Cross sectional | Late release of funds and short payback period are major problems faced by beneficiaries. |
| 14 Mpuga (2010) (Uganda) | 1 | exploratory Cross sectional | Young and educated people are more likely to get required institutional credit |
| 15 Diagne & Zeller (2001) (Malawi) | 1 | exploratory Cross sectional | Higher size of landholding and livestock are negatively correlated with access to formal credit. |
| 16 Gine & Yang (2009) (Malawi) | 1 | exploratory Cross sectional | Bundling an insurance scheme with crop loan increases effective interest rate on loan and thereby suppress the demand for loan |
| 17 Salami & Arawomo (2013) (Cross country) | 1 | empirical | Incidence of higher rate of savings initiates higher farm credit |
| 18 Akpan et al. (2013) (Nigeria) | 1 | exploratory cross sectional | Age, gender, land size, visit by extension agents, distance, literacy level organizational membership, size of household and distance significantly affect access to credit |
| 19 Munyambonera (2014) (Uganda) | 1 | exploratory Cross sectional | Informal sector caters to majority of needs of rural communities in Uganda |
| 20 Sharma et al. (2012) (India) | 1 | exploratory Cross sectional | Dearth of financial institutions is the principal demand side constraint while inadequate staff and dominance of large farmers are principal supply side constraints to credit |
| 21 Turvey et al. (2012) (China) | 1 | exploratory Cross sectional | Demand for credit is not highly inelastic for all households |
| 22 Das (2015) (India) | 1 | exploratory Cross sectional | Expenses on children education, occupation, family size land size are significant determinants of agricultural credit |

| | | | | |
|----|---|---|------------------------------------|--|
| 23 | Akudugu (2012) (Ghana) | 1 | exploratory Cross sectional | Age, gender, affiliation to political party are demand side while type of crop, land size and incidence of savings are supply side determinants of amount of credit |
| 24 | Yuan et al. (2011) (China) | 1 | exploratory Cross sectional | the incidence of high savings and income lower down credit constraints |
| 25 | Baiyegunhi & Fraser (2014) (South Africa) | 1 | exploratory Cross sectional | Gender, education, asset value, repayment capacity of borrower, social capital and income affect household's demand for credit |
| 26 | Ololade & Olagunju (2013) (Nigeria) | 1 | exploratory Cross sectional | Gender, marital status, interest rate and presence of guarantor significantly affect household's access to credit |
| 27 | Ugbajah (2011) (Nigeria) | 2 | exploratory Cross sectional | Males have better access to formal financial services than females. |
| 28 | Jeyol et al. (2013) (Nigeria) | 2 | exploratory Cross sectional | Factors constraining credit are different for males and females |
| 29 | Chavan (2008) (India) | 2 | descriptive | The share of women in terms of both number of accounts and amount of loans is lesser as compared to male borrowers |
| 30 | Akudugu et al. (2009) (Ghana) | 2 | exploratory Cross sectional | Years of schooling, annual income, application procedures, land size, savings, type of crop, rate of interest and distance from rural banks significantly affect women farmer's access to credit |
| 31 | Jumrani & Agarwal (2012) (India) | 3 | descriptive | The gap between small and large landholders in terms of amount outstanding per account is widening. |
| 32 | Satyasai (2008) (India) | 3 | descriptive | The multiagency approach to credit delivery in rural India has turned out to be ineffective |
| 33 | Ayegba & Ikani (2013) (Nigeria) | 3 | exploratory Cross sectional | High interest rate and inadequate credit are major challenges in access to formal credit, thereby making private moneylenders a primary source of credit |
| 34 | Mandal et al. (2005) (India) | 3 | exploratory Cross sectional | Farmers constrained by insufficient capital to invest in farm operations |
| 35 | Bista et al. (2012) (India) | 3 | empirical | Net margins on total output higher for beneficiary of Kisan Credit Cards than non-beneficiary |
| 36 | Singh et al. (2009) (India) | 3 | exploratory Cross sectional | Transaction costs higher for obtaining credit from institutional sources than non-institutional sources |
| 37 | Konare (2001) (Mali) | 3 | empirical | Shortage of development investment finance with rural households |
| 38 | Satyasai (2012) (India) | 3 | empirical | Higher credit use associated with increased use of input in production |
| 39 | Pradhan (2013) (India) | 3 | descriptive | institutional credit is restricted to less risky activities, informal credit used for non-productive purposes while role of micro-finance is dubious |
| 40 | Golait (2007) (India) | 3 | descriptive | Credit delivery to small and marginal holders is inadequate |
| 41 | Badiru (2010) (Nigeria) | 3 | descriptive | High incidence of repayment for loans from informal and semi-formal Sources of finance |
| 42 | Joshi & Gautam (2014) (India) | 3 | descriptive | Presence of regional disparities in disbursement of credit |
| 43 | Bashir et al. (2013) (India) | 3 | descriptive | Highest increase in total loans issued by scheduled commercial banks while lowest was for cooperatives during study period |
| 44 | Devaraja (2011) (India) | 3 | descriptive | Flow of credit to small and marginal farmers is inadequate in relation to its demand |
| 45 | Shukla & Tewari (2012) (India) | 3 | descriptive | Direct finance to agriculture increased for small and marginal holders during pre and post liberalization period |
| 46 | Singh & Kant (2014) (India) | 3 | exploratory Cross sectional | Institutional credit is utilized mostly for productive purposes |
| 47 | Chisasa & Makina (2012) (South Africa) | 3 | descriptive | Commercial banks prefer lending to large farmers than small farmers due to lack of collateral |
| 48 | Ramakumar & Chavan (2007) (India) | 3 | descriptive | Agri-business oriented units capture significant proportion of direct finance as compared to small and marginal landholders. |
| 49 | Mohan (2006) (India) | 3 | descriptive | Gaps in the flow of agriculture credit via institutional setup in India. |
| 50 | Jan et al. (2012) (Pakistan) | 3 | Exploratory Cross sectional | Non-upgraded land records, lack of collateral, cumbersome loan procedure, rigid repayment schedules are responsible for not preferring formal credit. |

| | | | | |
|----|--|---|------------------------------------|--|
| 51 | Gulati & Bathla (2002) (India) | 3 | descriptive | High incidence of bad debts in most of the rural finance institutions. |
| 52 | Olowa & Olowa (2011) (Nigeria) | 3 | conceptual | Ineffective agricultural credit policies and their inadequate monitoring and evaluation make institutional credit ineffective |
| 53 | Satyasai & Badatya (2000) (India) | 3 | descriptive | Inter-state variation in disbursement of credit |
| 54 | Kumar & Singh (2010) (India) | 3 | empirical | Share of institutional credit to total credit has declined over past four decades. |
| 55 | Binam et al. (2004) (Cameroon) | 4 | exploratory Cross sectional | Credit is an important determinant of technical efficiency of farmers |
| 56 | De Rosari et al. (2014) (Indonesia) | 4 | exploratory Cross sectional | Use of credit and capital supports significantly impact production, consumption and investment behavior of farmers. |
| 57 | Kumar et al. (2012) (India and China) | 4 | exploratory | Constraining credit has more severe impact on productivity in India than China |
| 58 | Ahmad (2011) (Pakistan) | 4 | empirical | Indirect credit has significant positive impact on agricultural output. |
| 59 | Sjah et al. (2003) (Indonesia) | 4 | exploratory Cross sectional | agricultural credit has little impact on agricultural production and farmer's income |
| 60 | Bolarinwa & Fakoya (2011) (Nigeria) | 4 | Exploratory Cross sectional | Agricultural credit is positively correlated with farm production |
| 61 | Obilor (2013) (Nigeria) | 4 | empirical | Agricultural credit guarantee loan has significant positive impact on agricultural productivity. |
| 62 | Saleem & Jan (2011) (Pakistan) | 4 | empirical | Increased use of credit increases agricultural GDP in Pakistan |
| 63 | Dong et al. (2010) (China) | 4 | exploratory Cross sectional | Constrained access to credit decreases the overall farm productivity |
| 64 | Kishore (2012) (India) | 4 | descriptive | Commercialization of Indian agriculture has made it less profitable for the farmers. |
| 65 | Sriram (2007) (India) | 4 | Exploratory Cross sectional | Causality between agricultural credit and output cannot be directly established |
| 66 | Owuor & Shem (2012) (Kenya) | 4 | Exploratory Cross sectional | Participation in group based lending significantly impacts output |
| 67 | Das et al. (2009) (India) | 4 | empirical | Direct agricultural credit has immediate positive effect on productivity while indirect credit effects productivity with an year lag |
| 68 | Okulegu et al. (2014) (Nigeria) | 4 | empirical | Long-run relationship between agricultural GDP and commercial bank credit to agriculture sector |
| 69 | Sial et al. (2011) (Pakistan) | 4 | empirical | Agricultural credit has positive and significant impact on GDP |
| 70 | Fakayode et al. (2009) (Nigeria) | 4 | exploratory cross sectional | Credit along with other factor inputs is an important determinant of agricultural output |
| 71 | Olagunju & Adeyemo (2007) (Nigeria) | 4 | Exploratory Cross sectional | After merging beneficiaries more technically efficient than their before merging counterparts |
| 72 | Ammani (2012) (Nigeria) | 4 | empirical | Agriculture credit positively related to crop production, fishing and livestock sector |
| 73 | Iqbal et al. (2003) (Pakistan) | 4 | empirical | Positive significant relationship between institutional credit and agricultural GDP |
| 74 | Bruhn & Love (2014) (Mexico) | 4 | exploratory Cross sectional | Increased access to credit has positive effect on labor market and hence economic decisions of low-income groups |
| 75 | Chisasa & Makina (2013) (South Africa) | 4 | empirical | Bank credit has positive significant impact on agricultural output |
| 76 | Bashir et al. (2010) (Pakistan) | 4 | exploratory Cross sectional | Credit has significant positive impact on total farm output |
| 77 | Rima (2014) (Nepal) | 4 | empirical | Institutional credit is a significant determinant of improving agricultural GDP |
| 78 | Nagarajan et al. (1995) (Philippines) | 5 | Exploratory Cross sectional | Occupational specialization determines matching of non-institutional lenders with borrowers in rural informal credit markets |
| 79 | Jain (1999) (Cross country) | 5 | conceptual | Actions in formal sector have bearing on policies of informal sector |
| 80 | Beaman et al. (2014) (Mali) | 5 | exploratory Cross sectional | Higher marginal returns to investment leads to self-selection in credit markets |

| | | | | |
|-----|--|---|--------------------------------|---|
| 81 | Guirkinger (2008) (Peru) | 5 | Exploratory Cross sectional | Formal lenders employ contractual incentives to avoid risk whereas informal lenders substitute information-intensive lending for contractual risk |
| 82 | Bose (1998) (cross country) | 5 | conceptual | Credit rationing in formal sector has an adverse composition effect on availability of credit in informal sector |
| 83 | Kochar (1997) (India) | 5 | conceptual | Lower demand for formal credit limits its role in enhancing agricultural development |
| 84 | Chaudhuri & Gupta (1996) (India) | 5 | conceptual | The policy of agricultural price and subsidizing credit by government adversely affects interest rate in informal sector |
| 85 | Chakrabarty & Chaudhari (2001) (India) | 5 | conceptual | Providing formal credit at subsidized rates and in flexible amounts can increase efficiency of rural credit markets |
| 86 | Basu (1997) (India) | 5 | conceptual | Remarkable relation between congruence of interest and recognition of entitlement set. |
| 87 | Rui & Xi (2010) (China) | 5 | Exploratory Cross sectional | Demand for credit is positively correlated with land size, education, healthcare expenses, while negatively correlated with household's liquidity. |
| 88 | Li et al. (2013) (China) | 5 | exploratory Cross sectional | Credit rationing leads to significant welfare loss measured in terms of net income and consumption of households. |
| 89 | Barslund & Tarp (2008) (Vietnam) | 5 | exploratory Cross sectional | Formal loans are utilized for production purposes while informal loans are utilized for consumption purposes. |
| 90 | Kohansal & Mansoori (2009) (Iran) | 6 | Exploratory Cross sectional | Interest rate, experience in farming and total application costs are important factors affecting loan repayment by farmers. |
| 91 | Duy (2013) (Vietnam) | 6 | exploratory Cross sectional | Repayment performance of farmers is higher as compared to non-farmers. |
| 92 | Idoge (2013) (Nigeria) | 6 | exploratory Cross sectional | Age, literacy level, loan amount, net income from farm, farm size, side job, effective supervision have positive impact on repayment while gender, marital status and household size impact it negatively |
| 93 | Weber et al. (2014) (Madagaskar) | 6 | exploratory Cross sectional | Delinquency of seasonal and non-seasonal farmers are same |
| 94 | Wongnaa & Awunyo-vitor (2013) (Ghana) | 6 | exploratory Cross sectional | Education, experience, age, net margin, income from other sources and effective supervision are positively associated with repayment while gender and marital status affect it negatively |
| 95 | Afolabi (2010) (Nigeria) | 6 | exploratory cross sectional | Loan amount, years of experience in farming, size of landholding, farm income, income from other sources and rate of interest charged on loan significantly affect loan repayment by farmer households |
| 96 | Augwumba et al. (2014) (Nigeria) | 6 | exploratory Cross sectional | Gender and annual income from farming positively influence loan repayment while family commitments, price fluctuation, incidence of diseases and pests constrain it |
| 97 | Ojaiko & Ogbukwa (2012) (Nigeria) | 6 | Exploratory Cross sectional | Positive influence of loan size and farm size on repayment rate |
| 98 | Miller (2011) (Cross country) | 7 | conceptual | Management of agricultural risk and investment can be improved with microfinance |
| 99 | Asanoy (2004) (Yemen) | 7 | exploratory cross sectional | Income, literacy rate and family size significantly affect preference for microfinance |
| 100 | Rao & Priyadarshini (2013) (India) | 7 | descriptive | Microfinance serves as an important tool to reduce income and consumption disparities |
| 101 | Balogun & Yusuf (2011) (Nigeria) | 7 | exploratory Cross sectional | Social capital variables, credit variables and dependency ratio of households significantly affect their demand for credit. |
| 102 | Coleman (1999) (Thailand) | 7 | exploratory Cross sectional | Group lending program loan significantly and positively impact high interest debt for females |
| 103 | Knight & Hossain (2008) (Barbados) | 7 | descriptive | Small markets, intense competition, poor repayment, over emphasis on collateral pose constraint to growth of MFIs. |
| 104 | Admassie (2004) (Ethiopia) | 8 | descriptive | Scarcity of deposit facilities in rural areas hamper welfare of small and marginal farmers. |
| 105 | Izhar & Tariq (2009) (India) | 8 | empirical | Institutional credit as percentage to agricultural GDP increased enormously during post reform period |

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| 106 Sahu & Rajasekhar (2005) (India) | 8 | descriptive | Incidence of bank branches positively associated with credit supply to agriculture and share of agriculture credit to net bank credit declined after banking sector reforms |
| 107 Singh et al. (2011) (India) | 8 | empirical | Credit to agriculture sector has significantly reduced after WTO period |
| 108 Laoubi & Yamao (2012) (Algeria) | 8 | descriptive | Various phases of agriculture development have yielded mixed results on agricultural development |
| 109 Shafiai & Moi (2015) (Malaysia) | 9 | exploratory cross sectional | Most households face financial constraint in second cycle cultivation in the study area |
| 110 Hassan et al. (2012) (Pakistan) | 9 | empirical | Positive relation exists between Islamic banking and agriculture sector in the study area |

Notes. 1- determinants of agricultural credit; 2- gender issues in agricultural credit; 3- status and performance of agriculture credit; 4- credit and productivity and growth; 5-rationing in credit markets; 6- repayment issues in agricultural credit;; 7- credit via micro finance institutions; 8- performance of agricultural credit pre and post reforms; 9- agricultural credit via Islamic Banking.

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