FINANCIAL CONSTRAINT TO IRRIGATION EXPANSION IN ETHIOPIA AND ALTERNATIVE STRATEGIES FROM ASIAN EXPERIENCE

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ABSTRACT

Despite having profitable irrigation endeavours by smallholder farmers in Ethiopia, it is not expanded to cover the surrounding rain-fed dependent poor farmers. Because of lack of irrigation, the poor smallholder farmers expand their rain-fed land to increase their harvest instead of intensifying their limited landholding to increase yield and output. Recently, Ethiopia approved a strategy and listed ways of investing in irrigation such as allocating government budget, targeting financial sustainability and cost-recovery, extending credit facilities and bank loans for community based small-scale irrigation projects and mobilizing financial resources from external sources; but there are limited achievements in increasing the share of irrigated land in the total arable land which is only 5% of 11.7 million ha and this share is unchanged for long time.

Using quantitative and qualitative analysis, this study explored constraints to expanding irrigation at microeconomic level and evaluated the financing system at national level to compare it with the Asian experience of financing irrigation. A case where irrigation-scheme expansion is possible but not realized is Wonji Kuriftu Irrigation Scheme in central Ethiopia. The findings show that though profitable and cost-effective, financial and institutional gaps limit the expansion of a small-scale irrigation schemes in Ethiopia and the low share of irrigated land remained very low since the 1970s. Asian experience of financing irrigation schemes increased the share of irrigated land in the potential. To increase their share of irrigated land, Asian countries had a ‘big push’ investment in their irrigation history and they consistently allocated sufficient agricultural budget and encouraged private banks to lend for local and individual farmer investments. Ethiopia needs to supplement local borrowing alternatives to subsidies and donor-pledges to finance the expansion of irrigation and need to have a ‘big push’ in irrigation investment to feed its population. Designing innovative system of financing irrigation is imperative and accordingly some alternatives of financing are suggested.

Keywords: Irrigation expansion, small farmers, financing irrigation, Experience, Asia, Ethiopia.

1. INTRODUCTION

Smallholder farmers in Ethiopia run 95% of the agricultural production to feed a population of 95 million from an average rain-fed land of less than 1ha. The share of rain-fed crops dominates agricultural production and irrigation contributes less than 5% of total crop land. Due to low output and yield in rain-fed agriculture, the country is

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cereal-importer, and on average 10% of the population is food-aid dependent. Even though there is irrigation potential to increase output and yield, there is under-investment in irrigation like in many other developing countries (Ward, 2010). Thus, to overcome weather risk and increase yields the Ethiopian governments approved irrigation development strategy. However, the 5% share of irrigated land in the total arable land of 11.7 million hectares is unchanged for long time.

The Wonji Kuriftu (WK) Irrigation Scheme in central Ethiopia was commissioned by Wonji Sugar Factory in 1989 and was given access to the farmers who were evicted from the sugarcane-land. Currently, 183 farmers use the irrigation scheme. The user farmers irrigate 55ha of land with per farmer irrigation landholding of 0.25-0.375 ha. Non-users of irrigation around WK repeatedly applied to the local Bureau of Agriculture for the scheme expansion to their plots. After applying for many years, the design of the scheme expansion was completed in 2010 to enable them irrigate 173.6ha of land. However, the project was not implemented.

Theoretically, several factors could impede investments in irrigation, including economic, e.g. financial & market (Fafchamps and Pender, 1997); agronomic, technical, and institutional factors (Faurè s et al. 2007). Thus, (a) why scheme expansion cannot be realized when irrigation is integral, profitable, and irrigable land is not constraint; and, (b) weather the experiences of Asian countries is relevant, are research questions to be answered in this study. Note that Irrigation financing is a neglected area of study whereas it is an ‘uphill battle’ for developing countries (Briscoe, 1999).

2. OBJECTIVE

This study investigates factors that limit the expansion of a small-scale irrigation schemes in Ethiopia at local and national levels. In addition, the study reviews irrigation financing in Asia to suggest alternatives of financing irrigation in Ethiopia.

3. METHOD AND DATA

The study uses a qualitative and quantitative analysis of data and national irrigation budget. The qualitative information is obtained from a small-scale irrigation scheme called WK and WUAs in central Ethiopia, and the national budget allocated for several countries is obtained from secondary sources. As a micro basis to the widespread underinvestment in irrigation expansion, the authors visited the WK irrigation scheme and the WUA in July 2013 and discussed with key informants including the experts of local Irrigation Authority, officials of WK Irrigation WUA, and irrigation user and non-users. Also, quantitative survey was conducted in December 2013 and collected secondary data from stakeholder Bureaus at local level.

In addition to the micro data, the study used secondary data and literatures of the macro-investment in irrigation of Thailand, Philippines, Sri Lanka, and Japan and compared it with Ethiopia’s irrigation features.

4. RESULTS

4.1 Market, labor, geographical, environmental and agronomic factors

Among the economic factors that could constrain the expansion of WK, market availability could be one. However, about 89% of the interviewed farmers (Wakeyo et al. 2014) from WK WUA reported that market problem is not their concern, except the interference of brokers. For users of WK, the market condition is attractive because of
the geographical proximity to populated cities such as Addis Ababa, Adama and Wonji. Similarly, the survey data shows that labor shortage is not a challenge and neither are the soil and climatic conditions. However, for expansion the slope towards non-users land is too long and hilly and it requires powerful pump, which increased the expansion cost of WK.

4.2 Source of finances and government financing

4.2.1 Irrigation scheme financing

The interview and data from the sub-district Bureau of Irrigation Development Authority indicates that the major constraint to the expansion of WK irrigation scheme is finance shortage. The farmers who applied for the scheme expansion cannot afford to finance even 10% of the cost. In Ethiopia, expansions of small-scale community irrigation projects, which are similar to WK, are financed by the government subsidy.

One source of government finance is donors’ fund. Donors use three channels to fund projects. (1) Through MoFED, then to the regional Bureau of Finance and Economic Development (BoFED); (2) through federal government line ministries to the corresponding sector or local bureaus. (3) Directly donors and NGOs fund projects (MoFED, 2010). Because of donors’ influence, the government often spends on poverty-reduction oriented sectors (education, health, road-infrastructure, agriculture, etc). Accordingly, the Federal Government redistributes the resource to projects to national and 500 sub-districts, depending on their priority. This means that WK irrigation expansion has to compete with planned projects listed at national, regional and local levels.

In Ethiopia unless the government finances the expansion WK irrigation-scheme, by law, regional and sub-district public institutes cannot borrow from banks to finance any project (MoFED, 2010). In addition, credit and saving cooperatives in Ethiopia have credit ceiling and their borrowing does not finance even the smallest irrigation schemes such as WK. The restriction to credit thus implies: (1) finance shortage cripples investments in irrigation; and, (2) a project plan has to wait indefinitely if government has to finance it.

Another question is what could sub-district Bureaus do to finance the WK expansion? The sub-district Bureau of WK could look financiers (e.g. NGOs) WK expansion. The BoID fail to promote the expansion of WK and reasons out that priority is given to more water-stressed areas and lack of institutional capacity to promote it. However, only few of the said water-stressed areas did benefit. Therefore, it can be concluded that the other constraint to the expansion of WK is institutional constraint, in line with Small et al. (1989: Vii).

The experience of other African countries also indicates that individual farmer’s investment as an alternative of financing irrigation. For example in Kenya farmers borrow money in group collateral and invest to develop 0.005ha-1ha (Grimm and Richter, 2006). In case of Ethiopia, by law only small amount of restricted loan is allowed, e.g., just for a simple motorized-pump.

4.2.2 Overall national level agricultural and irrigation financing

Chanyalew and Mellor (2011) studied agricultural investment plan in Ethiopia. In this document, irrigation development is top investment priority, assumed a gradual increase in the funds allocated to the agriculture and rural development from 6.2% of GDP in 2008/09 to 7.5% in 2019/20. However, the 10-years budget planned to develop irrigation is lower compared to the expenditure plan of Asian countries at the
time of irrigation take off of the 1970s & 1980s. For example during 2006-2010, that of Ethiopia is more than twice that of Sri Lanka’s, only 48% of Philippines and only 38% that of Thailand. The ICID (2010) data also shows that in both absolute figure and as a share of irrigation potential that of Ethiopia is only 12.5 % (540,000ha), whereas that of Sri Lanka, Philippines (NIA, 2013) and Thailand is 100% (570,000), 55.6% (1.68m ha) and 49% (6.4M ha), respectively. Also note that these Asian countries spend on average up to 40% of their Agricultural budget on irrigation in the 1970s and 80s, a ‘big push’, and sustainably rehabilitated their schemes, whereas Ethiopia did not have such a big-push investment in irrigation it its irrigation history (Figure1).

Figure 1.  Ethiopia: share of agriculture in total expenditure in 1984, 1989 & 1994-2010* [Source: Based on Tewodaj et al. 2008, Bahiigwa and Benin, 2013, Nganwa, 2013]

During 2010/11-2015/16, the Federal and local government are implementing Growth and Transformation Plan (GTP, 2010), allocating 60% of the budget towards the poverty oriented sectors. However, even in the GTP the investment finance meant for irrigation is insufficient to bring substantial change to the irrigated land. Nganwa (2013) data also indicates that external donation and borrowings that Ethiopia accessed is not sufficient and waiting for government budget limits investment in irrigation.

4.3 Review of the Asian experiences of financing irrigation projects

In 1996, experts from 12 Asian countries who are concerned with the hunger and poverty in Asia set an event in Bangkok to stimulate governments’ commitment to forge public-private cooperation and invest in river basin development for sustainable Asia-pacific green revolution and they called the event Bangkok declaration (FAO, 1999). The high share of irrigated land in irrigation potential of Asian countries seems to show the commitment of their governments to invest and look for stable funding (FAO, 1999).
Table 1. Percentage of irrigated land of some Asian countries and Ethiopia

<table>
<thead>
<tr>
<th>Country</th>
<th>Year (a)</th>
<th>Irrigation potential, ha</th>
<th>Irrigated land (ha)</th>
<th>% of potential (year a)</th>
<th>Irrigated land as % of potential (latest year)</th>
<th>Investment approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>1995</td>
<td>12245000</td>
<td>5003724</td>
<td>40.9</td>
<td>52.4%(2010)</td>
<td>Government, (No data/nd)</td>
</tr>
<tr>
<td>Japan a</td>
<td>1993</td>
<td>9066896</td>
<td>3128079</td>
<td>34.5</td>
<td></td>
<td>Government, States, LIDs</td>
</tr>
<tr>
<td>Philippines</td>
<td>1993</td>
<td>3604651</td>
<td>1550000</td>
<td>43.0</td>
<td>49% in2008b, 55.6%,2013c</td>
<td>Government, community, non-govt., private</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>1995</td>
<td>600000</td>
<td>570000</td>
<td>95.0%</td>
<td>95.0</td>
<td>Govt., community, farmers</td>
</tr>
<tr>
<td>Ethiopia d</td>
<td>2012</td>
<td>4300000</td>
<td>400000</td>
<td>5.1</td>
<td>12.6%(2012)</td>
<td>Government, indiv. farmers</td>
</tr>
</tbody>
</table>

Source: FAO, 1999

a. Percentage of total agricultural land, e.g. Kikuchi et al. 1997
c. NIA (2013), Annual Report 2013
d. World Bank website

4.3.1 Country specific experiences

In financing irrigation, Asian countries have useful experiences fitting to the condition of Ethiopia during 1970s to 2000s than the recent trends. The data of financing of each of the three countries indicates that they had a 'big push' investment somewhere in their irrigation history (Figure 2, 3, 4).

Thailand

Thailand planned development of large and medium-scale irrigation was started in the 1960s where only 25% of the cropland was irrigated. Under the successive five-year plans, the government increased the irrigated land from 1.56million during 1961-66 to 4.49million ha during 2002-2006 (Isvilanonda and Buniyasiri, 2009:126). Over 1997-2007, the sources of finance were KW, Japan Bank of International Cooperative, Asian Development Bank/ADB and World Bank (ibid). Moreover, In Thailand commercial banks allocate 5% of all commercial loans for agriculture at lower than the market interest rate (ibid: 126) so that farmers borrow to buy inputs.

In addition, Ohno and Shimamura, (2007) indicated that from the early to the end of 1960s, the amount of grant dominant source of finance, accounting 60% whereas loans account 40%. After 1970, however, the later started to dominate and grants continuously declined from about 50% in 1972 to 15% in 2000. Moreover, between 1953 and 1985, Thailand implemented rice tax for irrigation financing.

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*This part depends on FAO (1999) for the rich data on Asian experiences during 1970s to 1990s.*
Figure 2. Thailand: Share of agriculture budget in total budget and share of irrigation budget in agriculture budget 1990-2014 (Source: computed from several sources of the Bureau of the Budget, http://www.bb.go.th)

Sri Lanka

During 1950-88, Sri Lanka supplemented the area irrigated by community reservoirs with modern irrigation. Sri Lanka uses joint sectoral expansion policy and most large-scale irrigation is associated with power generation (FAO, 1999). Partly due to the sectoral effect and partly due the huge Mahaweli irrigation, investment grew by an average of 52% during 1978-1983 (Figure 3).

However, government investment in irrigation as a share of total capital expenditure decreased due to the global reason of declining rice prices. The source of finance in Sri Lanka has been government source plus grants and loans from donors. Individual farmers’ investment in irrigation are subsidy for wells construction but not for pumps (Kikuchi et al. 1997) and farmers borrow from banks, and use informal sources of credit. This increased individual farmer’s investment share nationally from 5% in 1990 to about 20% at the end of 1990s.

Figure 3. Share of irrigation investment in total capital investment in Sri Lanka 1990-2014 (Source: Computed from the data of Ministry of Agriculture)
Philippines

Philippines invested highest resource in irrigation in the 1970s, and increased its share of irrigation potential to 55.6% in 2013 (NIA, 2013) from 43% in 1998. In 2013, Philippines irrigated 1.68 million ha of land (55.6% of its potential), (NIA, 2013). David (1995) indicated that during 1976-1992, foreign and local sources financed on average 40% and 60% of the total finance for capital projects, with the share of the foreign sources exceeding the local one during 1983-87 (average 63.3%). The author indicated that World Bank and Asian Development Bank are the forerunners covering on average 82.5% of the foreign finance during 1969-1992, but their role declined after 1982 to 20%. Ohno and Shimamura (2007) found that unlike the case in Thailand, in Philippines both loan and grant were increasing from 1972 to 2000.


In summary, Figure 5 indicates that in 2012 the total irrigated land in Thailand, Philippines and Ethiopia is respectively 6.4, 1.68 and 0.54 million ha. By implication, Figure 5 shows that the irrigated land in each country in the last 40 years signifies how much each country has invested.

Figure 5. Irrigated land in Ethiopia, Thailand & Philippines 1974-2012 (million ha) [Source: Authors’ Interpolation and extrapolation of the data available from various sources (ICID; NIA (2013), FAO, 1999; Kloos (1991)]
Even more interestingly, Figure 6 indicates the irrigation-development performances of each of the three countries relative to their potential, and how much worse that of Ethiopia is. The figure indicates that even in 2012, the share of irrigated land in Ethiopia does not reach the level where Thailand and Philippines invest in the 1970s relative to their potential. Therefore, to substantially increase its share of irrigated land, Ethiopia has to have a big push investment in irrigation.

![Figure 6. Share of irrigated Land in potential Ethiopia, Thailand & Philippines 1974-2012](Source: authors computed from several data sources)

**Japanese LIDs**

Based on the Land Improvement Act of 1949, farmers organize themselves as LIDs for irrigation (Similar to water users’ associations), and apply to their prefectural government for new investment. Ozawa (2005) assessed that Japanese LIDs have three sources of finance: 1) Central government, investing in high-tech facilities, e.g. Aichi and Nishkambara LIDs; 2) prefectural governments and municipalities (water sharing: the collaboration between Nigata City and Kamedagou LID); 3) The 1949 Act shows LIDs can borrow and issue bonds for their irrigation projects (Ozawa, 2005). In this approach, Japanese LIDs overcome irrigation finance shortage.

5. **DISCUSSION AND CONCLUSION**

This study investigated constraints to the expansion of Wonji Kuriftu irrigation scheme in Ethiopia and checked the constraint at micro and macro levels and found out that finance shortage is major constraint. The finding also indicates that weakness hindered local irrigation agencies to look for alternatives to finance WK. In addition, under the current irrigation financing modality, the sub-district and regional governments are not allowed by law to borrow for financing irrigation. Under such a condition, financing even small-scale irrigation project by government takes many years, even though no theoretically-known investment prohibiting constraint to irrigation expansion exists.

Asian countries irrigation financing is a source of experience for Ethiopia. Notably, (1) Asian countries had a ‘big push’ investment in irrigation. Of course Ethiopia invested in a few large-scale irrigation schemes in the 1970s and 80s (e.g. Gode & Alwero), but those large-scale irrigation schemes failed and consequently its national strategy shifted to encourage small-scale irrigation. In this study, the fact that feasible small-scale irrigation schemes such as WK is not financed in a foreseeable future indicates that both large and small-scale irrigation are in challenge in Ethiopia. Evidences show
that 90% of the financing of irrigation projects globally is from domestic sources whereas the remaining 10% is from foreign (Briscoe, 1999), but in case of Ethiopia such an arrangement is far from financing enough irrigation. (2) Asian countries stimulated pump and groundwater small-scale irrigation, e.g. in India, China, Sri Lanka, and Southeast Asia, and this increased the share of private farmer investment; 3) Asian countries (e.g. Thailand & Philippines) nearly maintained their share of irrigation investment budget; (4) They have Agricultural Banks who finance long-term investment (e.g. Thailand); and Japanese LIDs also have autonomy to borrow and issue bonds to finance irrigation. Similarly, there should be a room to allow borrowing from banks for smallholders’ feasible projects in Ethiopia such as WK; it should not be trapped by the question of priority of financing national projects (Small et al. 1989: 17).

Thus, it is relevant to learn from the experience of Asian countries to create viable financial system to expand irrigation in Ethiopia. Also, strengthening local Bureaus with institutional capacity, increasing the coordination of stakeholder bureaus, assess farmers’ willingness to pay and secure credit helps to expand irrigation. In Ethiopia, the competition with these non-irrigation projects limit irrigation to the level where some Asian countries were in the 1970s. To increase the irrigated land, establishing an irrigation fund could be viable. In addition, implementing the 'the user has to pay' principle effectively (Briscoe, 1999) of WUAs in Ethiopia can ease irrigation financing. Furthermore, it is essential to convince donors and NGOs with tangible evidence (e.g. project feasibilities) of cost-recovery to get their attention than merely waiting for public financing of irrigation projects.

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