SAARC Regional Initiative on Agricultural Mechanization

Engr. M A Matin[1]

About SAARC

The **South Asian Association for Regional Cooperation** (**SAARC**) is an economic and political organization of eight countries in Southern Asia. In terms of population, its sphere of influence is the largest of any regional organization: almost 1.5 billion people, the combined population of its member states. In 1980, Bangladesh proposed the creation of a trade bloc consisting of South Asian countries. The proposal was accepted by India, Pakistan and Sri Lanka during a meeting held in Colombo in 1981. In August 1983, the leaders adopted the Declaration on South Asian Regional Cooperation during a summit which was held in New Delhi. The seven South Asian countries, which also included Nepal, Maldives and Bhutan, agreed on five areas of cooperation:

- Agriculture and Rural Development
- Telecommunications, Science, Technology and Meteorology
- Health and Population Activities
- Transport
- Human Resource Development

Afghanistan was added to the regional grouping at the behest of India on November 13, 2005. With the addition of Afghanistan, the total number of member states raised to eight (8). The People's Republic of China, the European Union, the United States of America, South Korea, Iran, Myanmar, Australia, and Mauritius are observers to SAARC.

Table-1: General Information about SAARC countries

Country	Area (m. ha)	Population (million)	Agricultural Population (million)	Active Agricultural Population (million)	*Employment in Agriculture (%)	[2]Avg Farm size (ha)	Agril. Sector growth (%)	[1]Total GDP, 2005 (M. US$)	*Contribution of Agriculture to GDP (%)
Afghanistan	64.75	31.89	25.518		80			3,240	40
Bangladesh	14.4	143.8	72.04	37.719	63	0.6	4.67 (2005-06)	59,958	19.7
Bhutan	4.7	0.753	0.67	0.211	63	1.03	2.9 (2004-05)	840	24.7
India	328.72	1079.7	563.00	277.61	60	1.41	2.3 (2005-06)	785,468	17.5
Maldives	0.03	0.3	0.079	-	22	-	3.0 (2005-06)	817	16
Nepal	14.718	24.8	24.72	11.79	76	0.96	2.3 (2004-06)	7346	38
Pakistan	79.61	149.7	75.49	27.15	42	3.08	2.5 (2005-06)	110,732	19.4
Sri Lanka	6.561	19.5	9.28	4.198	34.3	0.595	3.0 (2005-06)	23,479	16.5

Source: [1]*World Development Indicators 2006. The World Bank. (http://devdata.worldbank.org/data-query/),* [2] Agricultural Research Data Book 2006, India; Statistical yearbook of Bhutan 2005; Statistical Information on Nepalese Agriculture 2004-05; Agriculture Statistics of Pakistan, 2003-04; Department of Agriculture Extension and Ministry of Agriculture, Bangladesh and www.statistics.gov.lk (Sri Lanka), * CIA- The World Factbook.

N:B: Economically active population is defined as all persons engaged or seeking employment in an economic activity, whether as employers, own-account workers, salaried employees or unpaid workers assisting in the operation of a family farm or business; Economically active population in agriculture including all economically active persons engaged principally in agriculture, forestry, hunting or fishing. *Source:* http://www.fao.org; Agricultural *Research Data Book (2006), ICAR, India.*

[1] Director General, Rural Development Academy (RDA), Bogra-5842, Bangladesh.

Table- 2: Land area classification according to use in SAARC countries, 2003 ('000' ha)

Classification of Land	Afghanistan	Bangladesh	Bhutan	India*	Maldives	Nepal	Pakistan	Sri Lanka
Total Area	64,750	14,400	4,700	328,726	30	14,718	79,610	6,561
Agri Area		9,019	543	180,804	14	4,225	25,130	2,356
Arable Land	7854	8,419	128	169,739	13	2,490	20,130	1,916
Permanent pasture	30000	600	415	11,065	1	1,735	5,000	440
Non arable and non permanent	56759.8	4,598	4,572	127,580	17	11,810	56,958	4,547
Irrigated land[#]	2720	4725	40	54800		1040	18230	743
Cropping Intensity (%)				137				

*Source: http://www.fao.org; *Agricultural Statistics at a glance 2003, India.* [#]CIA- The World Factbook

SAARC Agricultural Centre (SAC)

The SAARC Agricultural Centre (SAC) originally started its journey in 1989 as SAARC Agricultural Information Centre (SAIC). Located at the Bangladesh Agricultural Research Council (BARC) complex in Dhaka, it is the first Regional Centre established by SAARC. The Centre started functioning with a mandate for information management, primarily in the field of agriculture and allied disciplines.

With the passage of time, the Centre braced up broader challenges to make regional cooperation more responsive to the needs of the stakeholders and farming communities as South Asia heads for a new order of agricultural transformation. The SAARC Agriculture Centre thus has been given an enhanced mandate for agricultural research and development, policy planning, and knowledge management.

Goal

Promotion of agricultural Research and Development (R&D) as well as technology dissemination initiatives for sustainable agricultural development and poverty alleviation in the region.

Objectives

1. To strengthen agricultural research and accelerate technology transfer through establishing regional networks on agricultural and allied disciplines, particularly among agricultural research and extension institutes, professionals, policy planners and stakeholders.
2. To provide inputs for developing regional policies, strategies, projects, primarily through developing networks in crop, livestock and fisheries sectors; and for efficient management of soil, water and other natural resources.
3. To promote new and innovative techniques and systems in agriculture, including production, post-harvest and food processing.
4. To facilitate collaborative studies, *inter alia*, on agricultural marketing and distribution systems, harmonization of agricultural related standards, promotion of agricultural trade, food security, risks and disaster management in agriculture.
5. To facilitate and undertake collaborative capacity building programmes in agriculture and allied sectors with focus on skill development and research on frontier areas.
6. To collate and disseminate information for agricultural advancement in the region.

Importance of Farm Mechanization in SARRC Region

The farm mechanization has been well-received world over as one of the important elements of modernizing agriculture. The level and appropriate choice of agricultural mechanization has direct effect on land and labor productivity, farm income, environment, and the quality of life of farmers in South Asia. Agricultural machines also ensure timeliness of farm operations and increase work output per unit time. Suitability to small farms; simple design and technology; versatility for use in different farm operations; affordability in terms of cost and most importantly, the provision of support services are the basic requirement for the expansion of farm mechanization.

Contribution of Agricultural **Mechanization**

- Saving in seed 15-20%
- Saving in fertilizer 15-20%
- Saving in time 20-30%
- Reduction in labours 20-30%
- Increase in cropping intensity 5-20%
- Higher productivity 10-15%
- Reduction in drudgery of farm workers especially that of women

Source: Nawab Ali, 2006 (Apecam)

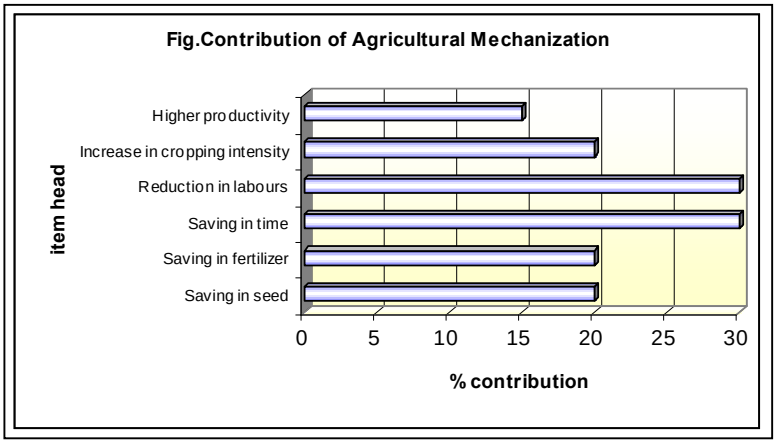

Table-3: Power sources available and needed in SAARC countries

Sources	Unit	Bangladesh	Bhutan	India	Nepal*	Pakistan	Sri Lanka
Agriculturally active population	kw/ha	0.142		0.09	44.3		
	%	13.07		6			
Total Draught Power	kw/ha	0.177		0.12			
	%	19.27		8	27.7		
Total Mechanical Power	kw/ha	0.77		1.29			
	%	70.65		86	28.0		
Total Power available	kw/ha	1.09		1.5			
Total Power needed	kw/ha						

Source: Apacaem 2006, 2007, * [a]Pariyar & Singh (1994); [e]stimated from the data of 1991/92; * based on cattle oxen percentage of 1998/99; ** Pariyar & Singh (1994); *** estimated value from CBS publications; Source: Agriculture Input Corporation/ Agriculture Input Company Ltd., 2001/2002

Agriculture is a dynamic industry and it still dominates the economy and society of SAARC countries. As indicated in the following exhibit, the ever-increasing size of the population in this region will create chronic food deficit with existing cereal production trends. To meet this deficit there are theoretically only two ways. One is to increase of agricultural land and other is intensive method of cultivation on the existing land. Scope of increasing agricultural land is limited. Therefore, the only feasible way to increase crop production in these countries is to follow intensive method of cultivation and this could be achieved by mechanization. The global threats of food deficit also forecast to produce 40% more grain in 2020, most of which will have to come from yield increases and reduced losses through

appropriate mechanization [2] .Agricultural mechanization is an art and scientific application of mechanical aids for increased production and preservation of food and fiber crops with less drudgery and increased efficiency.

Constraints to adoption and popularization of farm machinery

- Lack of knowledge and skill for efficient use, proper maintenance and repair of machinery at all levels of users and traders.
- Increasing cost of machines and fuel (diesel) and seasonal shortage of fuel and lubricants in the rural areas.
- Scarcity of proper spare parts, replaceable tools, accessories and servicing facilities.
- Unavailability of affordable efficient and quality harvesting machines for smallholdings as the farmers reportedly face problems of labour shortage at harvesting time.
- Absence of adequate design and fabrication guidelines, testing and other technical facilities for small workshops.
- Absence of product standards and quality certification useful for traders and users.
- Limited fund is available to conduct farm machinery research at farm level.
- Lack of effective linkages among researchers, manufacturers, farmers, and extension workers

Supply Chain

A common supply chain of agri machinery sub-sector in SAARC countries has been delineated in Fig 2, which involves importer, raw material trader, foundry or foundry cum agro tools manufacturer, spare parts manufacturer, wholesaler and retailer. The channels are identified based on the core business unit, i.e., the producers. In forward linkage the channels are up to the consumers i.e., the farmers. On the other hand, in backward linkage the channel goes down to the importers. The core business unit in most of the SAARC countries is fragmented and small. In general, the more integrated the units, the more capital-intensive they are. The integrated units also have fewer intermediaries. It was recognized that the integrated units mostly have their own outlets for both wholesaling and retailing.

[2] Soni Peeyush, Current situation of Agricultural Engineering in some key member countries of APCAEM, International Seminar on Restructuring and Strengthening R&D fo Agricultural Engineering, UN APCAEM, April 2007

Supply Chain:

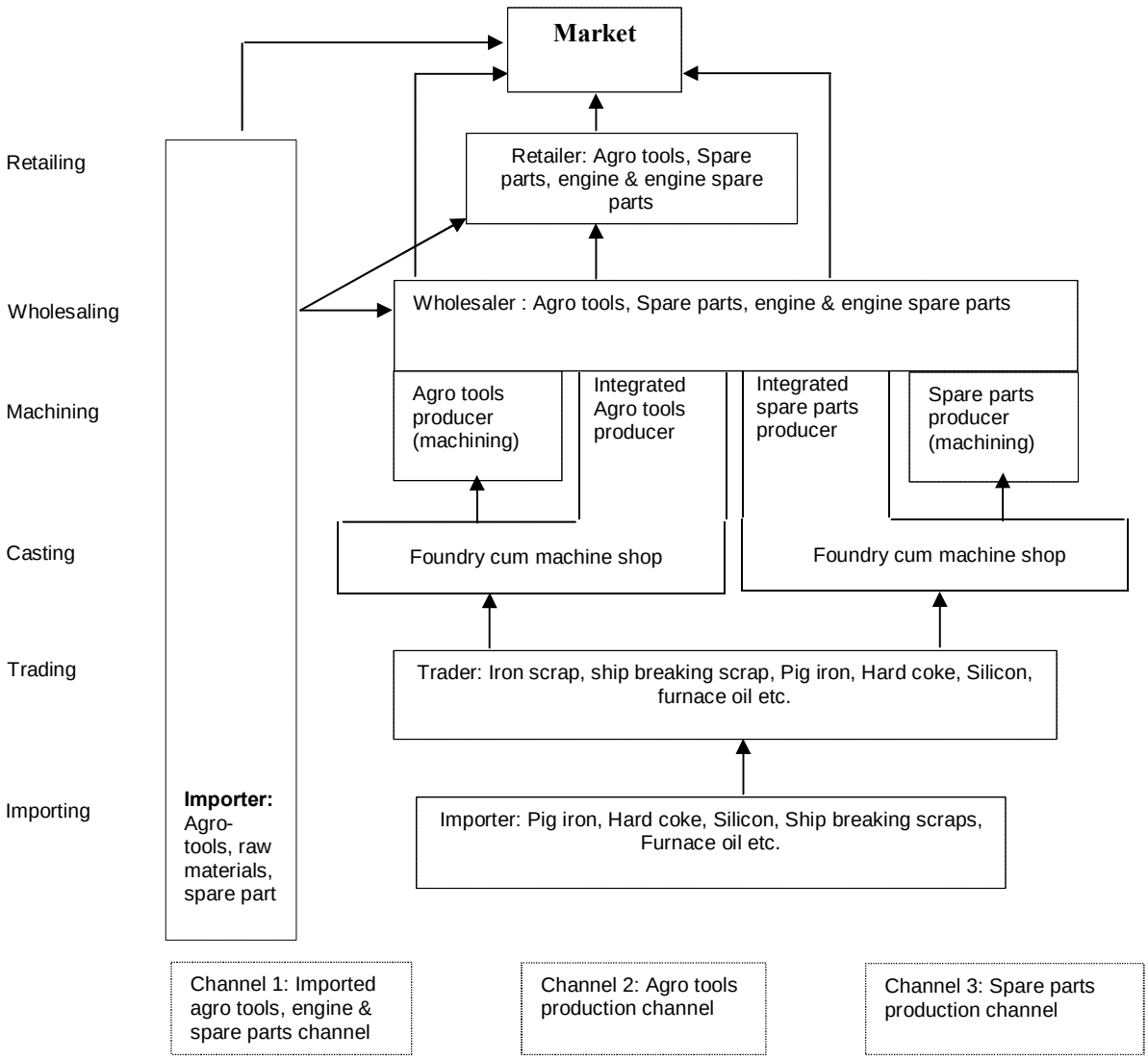

Fig 1: Common Supply Chain of Agri-machinery sub-sector

The Way Forward: Creating Agro Tools Service Market

At field level there are limited service providers with appropriate skill and knowledge to develop and train entrepreneurs/Custom-hire Service Providers on operation, maintenance and management of agricultural machineries. Therefore, Specialist Service Provider (SSP) would be developed with the understanding that it will build capacity and effective net-work among NGOs, agri-machinery producers and sellers to develop and train entrepreneurs/Custom-hire Service Providers of agricultural machines so that these organizations will take the role of SSP in course of time. Further, SSP will play the role of institution that will support in research and other development activities.

There are generally five main groups or levels of interested parties in this subsector which comprised farmers, retailers, wholesalers, manufacturers/importers and commercial banks/MFIs. In most free market economies, each of these groups is comprised of small to medium businesses. Bringing all actors of agro tools industry in a single array the following physical model has been developed to vibrate the industry and might be replicated in SAARC countries.

Service Market Model:

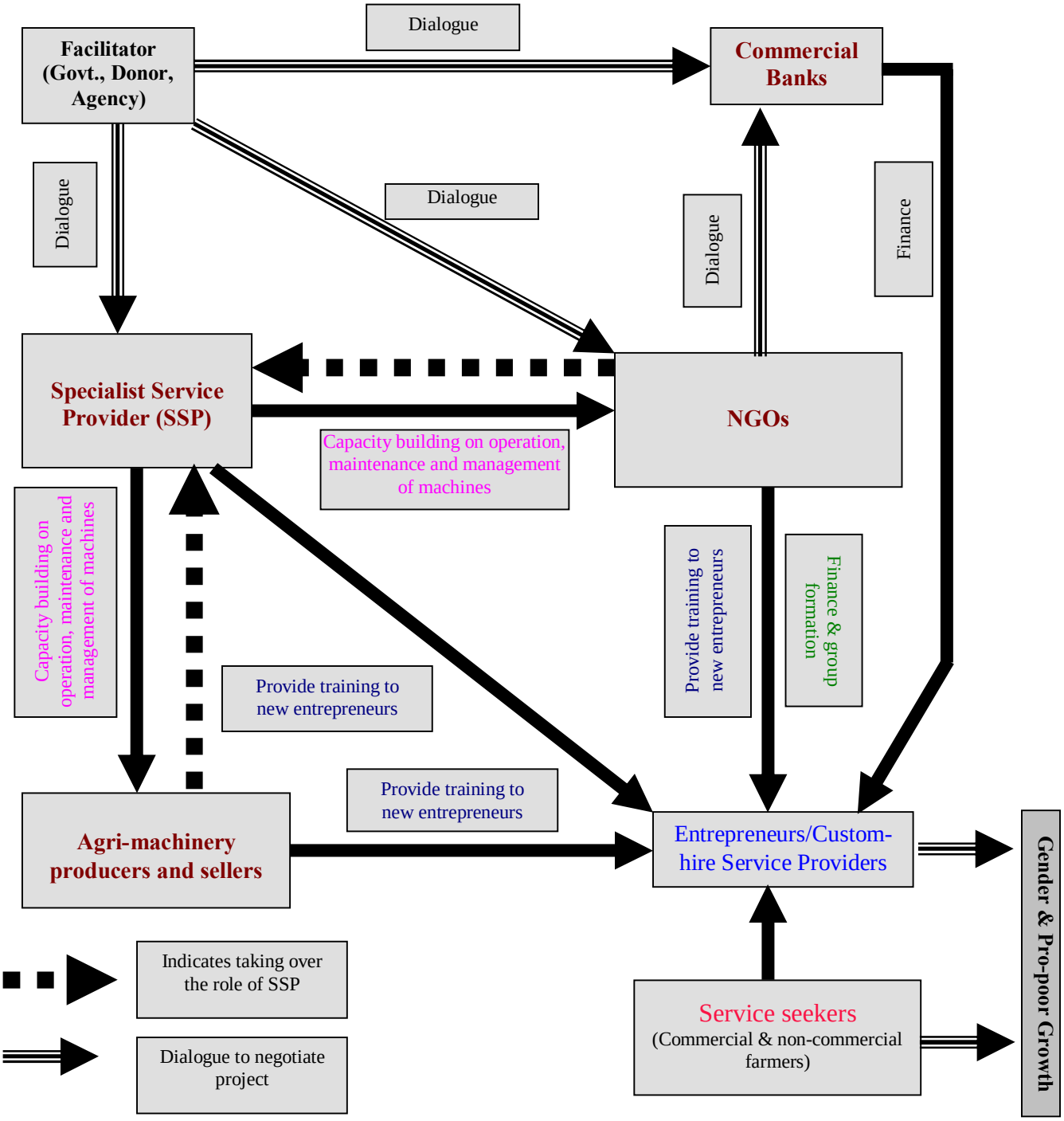

Fig 2: Creating Agro Tools Service Market

SAARC Initiative on Agricultural Mechanization

AFGHANISTAN

Afghanistan produces less food than its people need. The 50 tractors are the continuation of an effort to mechanize Afghanistan and increase the productivity of mid-sized farms that grow produce for the Afghan market. The joint effort between Afghanistanôs Ministry of Agriculture, Irrigation and Livestock; the U .S. Agency for International Development and International Relief and Development is working to provide up to 6,000 tractors to Afghan farmer.

Many Afghan farmers use oxen and human labor to plow land and plant seed. These tractors will increase efficiency of farms that use them.ñIn an hour spent working on the farm you can harvest and plow more land,ò said Suzanne Poland, food security team leader, USAID. ñThere are also seed drills so you can plant faster.ò Only 12 percent of Afghanistanôs land is suitable for growing produce and most mid-sized Afghan farms work small, fragmented, hilly fields where the smaller, two-wheel tractors are more effective than four-wheel tractors.

BANGLADESH

In the 20th century, the mechanization of farming is considered one of the top ten engineering accomplishments. In this regard, Bangladesh is no exception. Today's self-sufficiency in rice production could not be achieved without farm mechanization of some of the important operations. Irrigation was the first operation that was mechanized. For threshing rice, Japanese type pedal threshers and for weeding in wet-land weeders were introduced to a limited scale. Tillage was the next operation that was mechanized. The present cropping intensity of 181 per cent could not have been achieved without mechanization of tillage operation. At present about 85 per cent of land preparation is done mainly by power tillers and to some extent by tractors.

As pedal thresher proved inadequate to thresh bulk production of rice, power thresher has been developed and it is estimated that more than 60 thousand are in use in the country. Entire maize shelling is done by power corn sheller.

Though the percentage of agricultural drudgery has come down to 50 per cent from 90 per cent the total number of agricultural labours now engaged in farming has more than doubled in comparison to what it was in 1950s. Yet labour shortage becomes acute during sowing/planting and harvesting time. These two operations need immediate mechanization. Wage of agricultural labour is so high that use of imported rice transplanter, reaper and combine harvester became cost effective and farmers are using those in very limited areas. It is expected that these two operations would be mechanized shortly throughout the country.

If all the modern high techs in agriculture that are available in Bangladesh are adopted judiciously, it is expected that in spite of 1.36 per cent population growth and one per cent reduction of cultivable land every year, farmers, agricultural scientists and extension personnel will be able to feed the growing population.

Table- 4: Existing (annual) market size of agri-machinery

Agri-machineries	Annul market size (million Taka)		
	2011	2012	2013
Power Tiller	4200.00	4025.00	3000.00
Tractor	5525.00	4140.00	3996.00
Pump (STW)	1400.00	1600.00	1050.00
Engine (STW, Thresher, Corn Sheller)	21600.00	30000.00	21750.00
Thresher (ODT & CDT)	3320.00	4070.00	5216.00
Corn Sheller (Spike Pinion type & Spiral Rasp-bar Cylinder type)	107.00	142.00	215.00
Sprayer (Local)	126.00	420.00	428.00
Sprayer (Imported)	30.00	45.00	47.00
Spare Parts (local)	20000.00	20600.00	20800.00
Spare Parts (imported)	6000.00	5400.00	5400.00
Sub-total	**62308.00**	**70442.00**	**61901.00**
Repair & Maintenance	**8841.00**	**10609.00**	**12731.00**
Total market size	**71149.00**	**81051.00**	**74632.00**

Table- 5 : Status of farm machinery population in Bangladesh

Name of Machinery	Quantity
Power tiller	About 700,000
Tractor	>60,000
High speed rotary tiller	>4,000
Weeder	>2,50,000
Seeder	>1,000
Transplanter	>150
Seed cum fertilizer distributor	About 60
Sprayer	12,50,000
Combine	About 130
Reaper	About 500
Open drum thresher	280,000
Close drum thresher	About 50,000
Winnower	About 3000
USG Applicator	16,000
Dryer	About 600 (including rice mill dryer)
Hand maize sheller	12,000
Power maize sheller	3000
Deep tube well	24,718
Shallow tube well	9,25,152
Low Lift pump	77,784
Manually operated pumps	10,801
Traditional pumps	64,235

Source: *Bangladesh Bureau of Statistics;* BRRI; BAU; DAE

BHUTAN

The Agriculture Machinery Centre (AMC) has touched the lives of may Bhutanese farmers through the various services it provides. AMC has been instrumental in the transformation of the basic farm tools to labor and energy saving farm machines and tools. It has also been a major influence in the use of improved farming techniques. The AMC also takes pride in the creation and innovation of several tools and implements that are widely used in the Bhutanese agriculture by our farmers. A significant achievement of the AMC is the development of capacities of our farmers to embrace and apply new farming techniques and technologies.

Many kinds of farm machines have made inroad into the Bhutanôs unfriendly farm lands. Farm machines such as power tillers have also made way into farms which are inaccessible by road. Farmers have carried the machines and reassembled at their remote farms. A testimony to the success of the promotion of farm mechanization is the increasing demand for different types of equipments and machines from farmers from all over the country. AMC has stood a trusted partner to the Bhutanese farmers as they beat the constraints of a rough and landlocked farming terrain.

The farmers purchase the farm machines through credit provided by financial institutions. The loan recovery against farm machine purchases has enjoyed an excellent record. This is an indication of the benefits translating directly into enhanced income for the farmers.

Increasingly, farmers have been adopting new practices of farming. Come of the practices worth mentioning include cultivation, crop processing operations, nursery raising, paddy transplantation, rice milling, flour milling and oil milling. The adoption of new technology not only enhances yield and better output, it also makes agriculture a commercially viable enterprise. AMC takes pride in having promoted more than 3598 micro enterprises in post harvest processing with the involvement of farming communities in the rural regions. It has also supplied 220 tractors and 2002 power tillers besides many other varied farm machines. These ventures have proved to be highly profitable and sustainable investments.

INDIA

India in the Global Farm Equipment Market

Indian market is expected to contribute nearly 10 % in 2006 to the worldwide farm equipment market estimated at $ 66 Billion.

- Over the last few years Indian agricultural equipment market has been widely exposed to international trade.
- Global majors like John Deere, New Holland, Carraro and Same Deutz have already made an entry in Indian market, whereas Indian players are looking for alliances with foreign partners overseas.
- Many factors affecting agricultural equipment sales in India include the monsoon, government declared support prices for crops, commodity prices, crop production expenses (including fuel, fertilizer, pesticides and other costs) and the credit policy announced by banks.

Even though farm mechanization shows an increasing trend, there are wide ranging disparities in the levels of mechanization across states.

- Northern States such as Punjab, Haryana, Uttar Pradesh (particularly Western and Tarai belt) have achieved a faster growth in mechanization over various Plans
- The sale of other implements and machines like combine harvesters, threshers and other power-operated equipment have been increasing almost throughout the country
- The pace of mechanization in North-Eastern States has not been satisfactory due to constraints such as hilly topography, socio-economic conditions, high cost of transport, lack of institutional financing and lack of farm machinery manufacturing industries
- Mechanization in Western and Southern states of the country viz., Gujarat, Maharashtra, Rajasthan and certain areas of Tamil Nadu, Andhra Pradesh etc., has increased with the increase in area under irrigation and also with the growing awareness among farmer

Table-6 : Population and annual production of some of the farm implements and machines, India

Implements/machines	**Annual** sales	**Population in** 2004-05, Million
Tractor	1.75 lakhs	3.00
Power tiller	10000	0.130
Combines	600	0.006
Irrigation and diesel pumps	7.00 lakhs	32.00
Power sprayer/duster	4.5 lakhs	0.150
Seed drills	2.5 lakhs	1.700
Threshers	4.0lakhs	2.500

Source: Nawab Ali, 2006

MALDIVES

Traditional agricultural production in the Maldives is limited by poor soil, a low level of arable land, and a geographically split landmass which disallows large-scale commercial farming. In 1995, only 3,000 hectares of arable land was under permanent crops. However, a number of crops are grown for domestic consumption. These include coconuts, bananas, breadfruit, other exotic fruits, betel, chilies, sweet potatoes, and onions.

Until the development of the tourist industry, the fisheries sector was the Maldives principle economic activity and source of export earnings. In addition, it is the second largest source of foreign exchange and provides more than 10 percent of GDP. The government established the Maldives Fishing Corporation in 1979 to exploit the country's vast fisheries resource.

The use of fishing nets is illegal, and as a result, the more labor intensive traditional method of fishing by line and pole dominates. Although traditional small boats made of coconut wood remain in use, most are used in conjunction with outboard motors. The mechanization of the fishing fleet has been combined with the introduction of Fish Aggregating Devices (which allow the detection of shoals of fish).

NEPAL

Animate power is the main source of power, in Nepalese agriculture. Human power and animal power occupies 36.3 and 40.5 percent of the total farm power available in the country respectively. The available mechanical power in the country is only 23 percent. Most of the mechanical power is concentrated in Terai, the share of available mechanical power in terai is 92.28% that of total available mechanical power of Nepal. (FBC, 2006)

The traditional wooden tools and implements have continued to remain in use in the hills and mountains. There has been some improvement in their design and performance capabilities over time. Due to the lack of physical facilities (viz. road networks and electricity) and cultivation in narrow terraces in hilly areas; hill agriculture is mainly depended upon human and animal power. Indigenous wooden plough, local hoes, sickle are the major implements/tools used for agricultural operation. In hills only 2.7 percent of holdings own iron animal drawn plough for tillage.

In the valleys near the road heads it is observed that farmers have started using power tiller for tillage operation and it is spreading along with the extension of rural road. Due to increasing cultivation of vegetables near urban and peri-urban areas about 3 percent of the holdings in the hills own hand sprayer. The paddy sheller and polisher and mechanical grinding mills are found to be adopted in majority of villages of terai and hills. However in the mountains, still the milling is found to be performed in local devices such as mortar & pestle, quern and traditional water mills. Attempts have made to improve more than 2000 local water mills by changing the wooden runner in to metallic one to increase the grinding capacity and to derive power for multiple processing operations (viz. hulling, oil expelling etc.).

PAKISTAN

Pakistan is facing various issues and challenges in terms of agricultural mechanization development. Agricultural mechanization policy and strategy has just been in place. The National Network of Agricultural Mechanization needs revival. Machinery testing lab. and accreditation of machinery needs further improvement. In terms of livestock mechanization, only poultry sector has adopted few innovative technologies, and lots of work needed to be done in Livestock sector. Currently, mechanized sugarcane planting and harvesting is very expensive considering the cash-return that sugarcane farmers get. The European second hand wheat combine harvesters are being used for rice harvesting in Pakistan, which causes a lot of grain damage of rice. Fruit and vegetable planting and picking need to be mechanized and up-scaling seed processing machinery is needed as well. Introduction of Solar Power for Agricultural purposes need to be encouraged in Pakistan. Irrigation needs to be strengthened in Pakistan. Loss of land due to water and wind erosion has to be curtailed. Pakistan has undulated topography, and laser land leveling can play important role in terms of increasing water efficiency and reclaiming land for agricultural purposes. In addition, for encouraging youth in agriculture sector, value addition mechanization systems should be introduced.

Table-7 : Agricultural Machinery Used in Pakistan

Machinery (Nos)\Year	1968	1975	1984	1994	2004
Tractor	18,909	35,714	157,310	252,861	401663
Cultivator	14,338	31,619	146,863	236,272	369866
Mould Board Plough	2,335	2,734	7,319	28,413	40050
Disc Plough	2,513	2,938	6,355	20,372	29218
Blade	3,925	4,200	69,004	164,489	
Chisel Plough	-	-	712	6,535	
Rotavator	-	-	2,101	5,594	
Bar/Disc Harrow	2,007	2,373	8,140	12,233	23764
Ridger	-	120	4,711	10,984	71338
Grain Drill/Planter	563	1,174	11,251	64,126	70810
Sprayer	-	-	-	20,778	
Trailer	-	18,074	98,787	176,412	242655
Wheat Thresher	-	5,635	78,377	112,707	137270
Reaper	-	-	-	7,972	
Combine Harvester (Wheat & Paddy)	-	-	-	859	6000

SRI-LANKA

Sri Lanka being a developing country there is a series of technologies that are in the emerging stage. This is a situation where thorough extension methodologies on industrial and agricultural extension must be adopted. Through the experience at FMRC it is revealed that the manufacturers are reluctant to invest on producing new machinery as they are not sure of whether the farmers would taken up the new technology. On the other hand farmers are doubtful whether they could be able to derive the expected benefits from the new technology. In order to bring this gap closer the extension activities must be further strengthened.

Large-scale agricultural machinery manufacturers produced thousands of sprayers, water pumps, paddy threshers, trailers etc for local market. Many of these manufacturers received FMRC testing and advisory services for their quality improvements. Under the technical assistance from FMRC the local manufacturers produced a series of newly designed machinery. They are high capacity threshers, multi-crop threshers, lowland seeders, cono-weeders, manual operated Tran planters and pedal operated threshers. Many local machinery manufacturers were also trained to manufacture FMRC designed machines.

Conclusion

The farm mechanization has been well-received world over as one of the important elements of modernizing agriculture. The level and appropriate choice of agricultural mechanization has direct effect on land and labor productivity, farm income, environment, and the quality of life of farmers in South Asia. Agricultural machines also ensure timeliness of farm operations and increase work output per unit time. Suitability to small farms; simple design and technology; versatility for use in different farm operations; affordability in terms of cost and most importantly, the provision of support services are the basic requirement for the expansion of farm mechanization.

Mechanization is associated not only with diverse socio-economic and agro-climatic conditions of the region but also with sustainable policy environment taking into consideration of public, private partnership. Keeping the above in mind, SAARC Agriculture Centre should arrange workshop, ñSAARC Agricultural Machinery fairò almost every year in every SAARC countries that can be a common field of upgrading the Scientists, Researchers, Policy planners.

Suggestions

- SAARC may take policy for up scaling and modernization of the country based manufacturing workshops to produce precise agricultural machinery;
- Provide on-job training for the mechanics and technicians to develop their skill, efficiency as well as production of quality machinery
- SAARC can take initiatives to formulate policy in ministry level among the member states to make the successful machinery of one country available to the other states in duty and tax free cost as well as subsidized rate.
- Production of newsletters, bulletins, booklet, journal, technical publications, audio-visual documentaries on successful farm machinery and circulate among the SAARC member states.
- The individual countries can arrange operators training in massive scale for the end users to make them acquaint with modern machinery.
- Develop regional policies and strategies to educate their farmers and enforcing the aligned extension department exists in government and non-government level with sufficient budget allocation and logistics.
- Establish automated library services and on-line services and develop institutional linkages with relevant institutions.
- Undertaking activities leading to exchange of the best practices for adaptation and enhancing capacities of the agricultural communities of the SAARC countries.
- SAARC may create a regional platform of Agricultural Mechanization taking experience from SAARC forum.

References:

CBS (2002) Population Census 2001, Central Bureau of Statistics, Kathmandu

FBC (2006) Feasibility Study on Agriculture Mechanization in Terai Region of Nepal. Report submitted to Agricultural Engineering Directorate, Harihar Bhawan,Latipur

Agricultural Mechanization in Asia, Africa and Latin America Vol.xv,No.2,Spring 1984.

Mechanization Survey Report, FMRC, Sri Lanka 1991.

Dr Md Abdul Wohab,Agricultural Engineer, AAPI Project,International Fertilizer Development Centre (IFDC) Asia Division Bangladesh